

Subterranea

January 2009 Issue 18

ISSN 1741-8917

£4.00

In This Issue...

Tar Tunnel in the Severn Gorge

Berlin Weekend

Underground in Cappadocia

Yorkshire Stuy Weekend

Books, News and Reviews

The Magazine of Subterranea Britannica
www.subbrit.org.uk



Subterranea Britannica is a society devoted to the study of man-made and man-used underground structures and the archaeology of the Cold War. The main focus of interest is on abandoned and forgotten structures and in the case of Cold War structures studies are entirely confined to declassified and decommissioned structures. The society is open to all and its membership includes all walks of life. Members are invited to contribute to this magazine even if this just means sending very welcome snippets from Newspapers and magazines.

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Front cover photo: One of the five natural bitumen pools in the 'Tar Tunnel' in the Ironbridge Gorge - Photo by Nick Catford

Back Upper: 2008 Yorkshire study weekend - Sub Brit members on the entrance steps at the ROC Group Headquarters at Acomb - Photo by Roger Starling

Back Lower: 2008 Yorkshire study weekend - The Brunswick Tunnel air raid shelter in Harrogate - Photo by Nick Catford

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Newsletters of Subterranea Britannica are published by the committee of Subterranea Britannica. Original articles, book reviews, press cuttings, extracts from books and journals, letters to the editor etc. are welcome.

However the editor reserves the right not to publish material without giving a reason. The committee of Subterranea Britannica and the editor do not necessarily agree with any views expressed and cannot check the accuracy of any material sent in.

Printed By Hillary Press Ltd. 75 Church Road Hendon London NW4 4DP
Telephone: (020) 8203 4508 Fax: (020) 8203 0671

Subterranea Britannica Limited Registered in England Registration No. 6447148
Registered Office: 5 Railway Cottages, Old Station Way, Bordon, Hampshire, GU35 9HH



What's in a name?

Members will recall that Subterranea Britannica was incorporated as a company limited by guarantee at an EGM on 12 April 2008. We took the name *Subterranea Britannica Limited* to emphasise the change in our status from an unincorporated society. In subsequent discussions, the Committee felt that, long term, the inclusion of *Limited* in our formal title could make us

seem bureaucratic and less approachable. Consequently, a proposal was tabled and passed at an EGM on 11th October at which our name reverted to *Subterranea Britannica*. Our Society remains a company limited by guarantee and our Articles of Association remain unchanged.

Martin Dixon

SUBTERRANEA BRITANNICA DIARY

Summary of Forthcoming Events 2009

Sub Brit specific events

14 January Sub Brit visit to Thames Barrier (booking form enclosed)

24 January SB Committee meeting

14 March Hack Green open day for Sub Brit

April 2009 "Subterranea" 19 published

** Copy deadline 15 March **

18 April Sub Brit AGM and Spring Day Conference,
Royal School of Mines, London

1 - 4 May Sub Brit Trip to Northern France

August 2009 "Subterranea" 20 published

** Copy deadline 15 July **

4 - 6 September Sub Brit UK Study Weekend Kent and around

General events

25 April SERIAC (South East Region Industrial Archaeology Conference)
at Winchester

12 - 15 June 8th International Mining Conference, Redruth, Cornwall

19 - 21 June NAMHO (National Association of Mining Historical Organisations)
Conference, Matlock, Derbyshire

10 - 13 September 2009 Heritage Open Days

19 - 20 September 2009 London Open House



Paul Sowan meets 'old flame'

By Linda Bartlett

Subterranea Britannica was formed in 1974, and Paul Sowan attended his first meeting in October 1976. In 1977 he was persuaded to become secretary of the society and held that position until he became Chairman in 1984. Last year Paul himself decided to step down and this formally happened at the AGM in Spring 2008, when Martin Dixon was elected to become the new Chairman. Paul continues to serve as a member of the committee.

In recognition of Paul's long and sterling service in the role of Chairman, we decided to award Paul with a small token of the society's gratitude. At the Autumn Day Conference on 11 October 2008, Martin presented Paul with an authentic Miner's Lamp ("Eccles of Manchester") and a framed certificate. In reply, Paul said that he "appreciated a piece of technology from an appropriate era"!

The certificate reads: "**Subterranea Britannica**. This Miner's Lamp is presented to **Paul Sowan** in grateful recognition of 24 years of service as **Chairman of Subterranea Britannica from 1984 – 2008**. Thank you from your colleagues".



Martin Dixon presenting the miner's lamp to Paul.
Photo by Linda Bartlett

NEWS - EVENTS

REIGATE CAVE DAYS 2009

The Wealden Cave and Mine Society will be running guided tours of the Reigate Tunnel Road East and West glass-sand mines, and of the Barons' Cave at Reigate Castle, from 10.00 to 16.00 on the following four Saturdays in 2009 - 9 May, 13 June, 11 July, and 12 September. Tunnel Road, passing through the UK's oldest surviving public road tunnel (opened 1824), runs from London Road (near Reigate Station) to the High Street. The Barons' Cave entrance is in the dry moat at the west end of the castle earthworks, now a public park. A charge is made for entry, although the Barons' Cave is free on 12 September, that being Heritage Open Day.

For further information, or to book group visits at other times, contact andy.belcher@wcms.org.uk, visit <http://www.wcms.org.uk> or telephone 01737-243912 or 07974-748403.

8th INTERNATIONAL MINING HISTORY CONGRESS – JUNE 2009 – REDRUTH, CORNWALL

The 8th International Mining History Congress is to be held at Redruth, the weekend before the NAMHO event at Matlock, Derbyshire.

Details may be had from Roger Burt, Email R.Burt@ex.ac.uk or by way of www.ex.ac.uk/history/imhc/index/htm

NEWS – GENERAL

TONY JARRATT [c. 1950 – 2008]

Tony Jarratt, a member of Subterranea Britannica, has died of lung cancer, aged 58. Primarily an explorer of

natural caves, living near Priddy Green on the Mendip Hills, Somerset, he was most likely have been encountered by members as the proprietor of Bat Products, a supplier of caving equipment and of underground-related books at Wells. Before taking over Bat Products, he worked for the Ordnance Survey. He was co-author in 1977, with David Irwin, of *Mendip Underground*.

Tony Jarratt (popularly known as JRat) is credited with over 11,000 hours spent underground, in Somerset and the Scottish Highlands and worldwide. He was active in cave exploration and excavation, and is credited with the discovery of new caves, cave extensions, and the discovery of Pleistocene bone deposits.

SOURCE: Peter GLANVILLE, 2008, Other lives: Tony Jarratt. *The Guardian*, 19 September 2008, page 47.

NEWS - ARCHAEOLOGY

ARCHAEOLOGICAL SURVEY OF CORSHAM QUARRY TUNNELS COMMISSIONED, WILTSHIRE

English Heritage has commissioned Oxford Archaeology to make a large-scale survey of the former extensive underground building-stone quarry at Corsham, near Chippenham in Wiltshire. It is reported that the survey will cover 286 acres of underground quarry with 26 miles of roadways. Within this area there are the well-preserved remains of early 20th century cranes used for lifting blocks of stone; relics of the 1930s ammunition store; a World War II aircraft factory; and Cold War provision for a central government control bunker.

SOURCE: OXFORD ARCHAEOLOGY, 2007, Secret tunnels under Corsham. *Current Archaeology* 18(10)(214), page 6.

REOPENING OF GOODLUCK LEAD MINE, DERBYSHIRE

Goodluck Mine is an impressively complete small mine for galena, with a surviving powder house and coe (storage building) on the surface, and artefacts, inscriptions, and some fine stone stampling underground. The adit was dug in 1830, and the mine worked into the 1950s when it was blown in. Re-entry was effected in 1972, and the then owner Ron Amner allowed small groups, including Subterranea Britannica, to visit. Responsibility for the mine has now passed to the Goodluck Mine Preservation Group, established by Peter Naylor, Paul Chandler and other members of the Peak District Mines Historical Society. Guided tours remain on offer, in return for donations. For further information see the website www.goodluckmine.org.

SOURCE: David BARRIE, 2008, New era for Goodluck. *Descent* 199, page 12.

NEW MINE DISCOVERED NEAR BURREINGTON COMBE, MENDIP HILLS, SOMERSET

Investigation of a small collapse caused by a tractor at Lower Ellick Farm (ST 49266 58183) on the Mendip Hills has led to the discovery of a small mine working, but no datable features. A 10-metre shaft has given access to a 1.5m wide, eight metre long passage in which pick-marks and stemple sockets are reported. The only minerals noted are a calcite vein, and traces of yellow ochre. The mine has been named Mole Hole, after a line of molehills in a nearby field

SOURCE: ANON, 2008, Mole Hole. *Descent* 199, page 11.

2.5M YEAR OLD MASTODON DISCOVERED BY COAL MINERS, ROMANIA

The reportedly best-preserved bones of *Mastodon* found in Europe have been discovered by miners at a colliery at Racosul du Sus, about 100 miles north-west of Bucharest. The skeleton is 90% complete. The mammoth, about three metres high and seven metres long, is an ancestor of the modern elephants.

SOURCE: ANON, 2008, Romanians find 2.5m-year-old skeleton. *The Guardian*, 9 August 2008, page 22.

NEWS - CONSERVATION AND HERITAGE

BRUNEL MUSEUM EXTENSION INTO THAMES TUNNEL SHAFT, ROTHERHITHE, LONDON

The Brunel Museum in the Brunels' engine house at Railway Avenue, Rotherhithe, at the rear of Rotherhithe Station, is to be extended into the adjoining shaft of the Thames Tunnel (made 1825 – 43). A concrete shelf is to

be built inside the shaft to accommodate the extension. The Museum Director has been quoted as suggesting that this might be the first underground museum above an operating railway. However, Berlin Unterwelten's WWII air-raid shelter museum above Gesundbrunnen station north of the city centre has been open to the public for something like the last ten years or so. The Brunel Museum's website is www.brunel-museum.org.uk

SOURCE: ANON, 2008, New museum inside the Brunel shaft. *Greater London Industrial Archaeology Society Newsletter* 238, page 8.

GREENHAM COMMON, NEWBURY, BERKSHIRE

The World War II and Cold War base at Greenham Common is being returned to publicly accessible heathland. The cruise missiles were removed from their silos in 1991, and the base was purchased by the Greenham Common Trust in 1997 who have subsequently sold it for £1 to Newbury District Council.

SOURCE: AKAM, Jacky, 2008, West Berkshire living landscape. Remember Greenham Common? 1982 – 2008. Come and see it now ... *Natural World* 83, 25 – 28.

NEWS - DEFENCE AND MILITARY

CHANCERY LANE DEEP AIR-RAID SHELTER / KINGSWAY TELEPHONE EXCHANGE UP FOR SALE, LONDON

It has just been announced that the more-or-less-secret network of tunnels under High Holborn, Chancery Lane tube station (Central Line) and land to the south is to be offered for sale by British Telecom. Subterranea Britannica visited this interesting complex during the London Study Weekend, 1995.*

This started as one of the World War II deep public air-raid shelters, with two 'station size' tunnels below the Central Line platforms at Chancery Lane, from which there was an entrance. The shelter was designed and built to accommodate 8,000 people. After the War, during the Cold War, additional tunnels were driven to the south, the use of which appears to have been largely, if not entirely, as a secure telephone exchange. According to *The Guardian*, it has also been used by MI6.

As completed, the complex had access by lift from a rather anonymous entrance on the north side of High Holborn. A rather obvious ventilation shaft and goods lift serving the complex can be seen in Furnival Street and an emergency exit in nearby Tooks Court has recently been demolished. One wonders what attractions an emergency exit may have for the inhabitants of a 'nuclear bunker' during thermonuclear war!

SOURCE: BBC Radio News 13.00, 15 October 2008 / *The Guardian*.

HARRIS LEBUS FACTORY WORLD WAR II AIR RAID SHELTERS, HARINGEY, LONDON

The Harris Lebus factory manufactured furniture and, during both World Wars, war supplies such as ammunition boxes and aeroplane parts. In 1939 a complex of 12 inter-connected air-raid shelter tunnels was provided, with a total estimated length of 2.5 kilometres. The facility was made of pre-cast concrete sections, and features cross-passages and ventilation shafts.

The shelters were recorded by archaeological contractors CgMs before destruction and a number of wartime period artefacts recovered.

SOURCE: ENGLISH HERITAGE, 2008, Former air-raid shelters, GLS Depot site, Tottenham Hale. *London Region Archaeology: Greater London Archaeology Advisory Service Annual Review, April 2006 – March 2007*, 10 – 11 (including photograph.)

WORLD WAR II AIR-RAID SHELTERS CONSERVED AT LIMPSFIELD COMMON, SURREY

Six parallel covered trench shelters, each to accommodate about 50 children from the nearby Limpsfield Primary School (now Limpsfield C. of E. Infants' School), were constructed during World War II on Limpsfield Common, near the A25. These have now been conserved by the National Trust in collaboration with the Friends of Limpsfield Common. Five are sealed as hibernation sites for bats. The sixth shelter has been restored to its wartime condition, and can be visited especially as an educational resource for local schools. Each shelter has steps down and a gate at one end, and an escape hatch at the other. The escape hatch would have been accessed via a ladder from a curtained-off compartment in which there was a bucket-style lavatory. The shelters are of five-inch thick concrete construction, built in four feet deep trenches and covered with the excavated soil.

SOURCE: NATIONAL TRUST and FRIENDS OF LIMPSFIELD COMMON, 2008, *Limpsfield Common Air-Raid Shelters*. National Trust: colour-printed A3 sheet folded to A5.

GUARDIANS OF NUCLEAR MISSILE LAUNCH CODES AND KEYS ASLEEP ON THE JOB, NORTH DAKOTA, USA

Three persons in charge of nuclear missile codes and keys were reportedly asleep on duty at the Minot Air Force Base, North Dakota. Although the persons were in a locked room, and the classified launch codes (having recently been routinely changed) were redundant, it has been suggested that the incident does little for confidence in the USA's care with its nuclear arms. In 2007, too, pilots flew a B-52 bomber across the USA unaware that they were carrying six air-launch nuclear missiles!

SOURCE: Ed PILKINGTON, 2008, Sleeping crew held codes for nuclear missiles. *The Guardian*, 26 July 2008, page 23.

FIRE AT US NUCLEAR FACILITY

A fire caused \$1 million worth of damage at an unmanned underground nuclear launch site last spring, but the American Air Force didn't find out about it until five days later when a repair crew went to the launch site 100 miles northeast of Denver - because a trouble signal indicated a wiring problem. Flames never entered the launch tube where the missile stood and there was no danger of a radiation release.

The May 23 fire burned itself out after an hour or two and multiple safety systems prevented any threat of an accidental launch of the Minuteman III missile. The Air Force will not say whether the missile was armed with a nuclear warhead at the time of the fire. The fire, blamed on a faulty battery charger, burned a box of shotgun shells, a shotgun and a shotgun case that were kept in the room. A shotgun is a standard security weapon at missile silos. The battery chargers at all U.S. missile launch site have been replaced.

Source: *Associated Press*

SWISS BUNKER BECOMES THE FIRST 0-STAR HOTEL

Tourists in Switzerland can soon sleep in the world's first 'zero-star hotel', a former underground nuclear bunker.

A group of 15 guests inaugurated the hotel, sleeping the night from Thursday to Friday in the former bunker embellished with artistic decoration and real hotel duvets. But that was only a trial run and regular operation of the hotel will require approval of an operating budget by the town of Sevelen. The new hotel is aimed at guests with a modest income with a price of £6-9 per night.

In case of emergency, the hotel could be converted back into a nuclear bunker within 24 hours in line with a Swiss law that says all civil defence buildings have to be ready for use within one day. The hotel can start commercial operations if the town's population approves the project.

Source: *Associated Press* 10/10/2008

AUXILIARY UNITS HIDE FOUND UNDER TOP WELSH GOLF COURSE

A secret bunker used by the Auxiliary Units during World War II has been unearthed at one of Wales' top golf courses.

Workers renovating the course at the Marriot St Pierre Hotel and Country Club near Chepstow discovered what they thought to be a hole in the ground. Its true purpose only came to light after an appeal by the local newspaper in the area by the daughter of one of the members of local 'Abraham Patrol', an undercover Home Guard sabotage unit during WW2. The hide was found near the



The Abraham Patrol AU hide

5th green on the Old Course which has hosted events like the Solheim Cup and other European Tour events.

Source: BBC News 23.6.2008

NEWS – HEALTH & SAFETY

BOY DIES DIGGING TUNNEL, SOUTH WALES

A sixteen-year-old boy, on holiday from Wrexham, has died whilst digging a tunnel, reportedly eight feet high, in a sand dune at Cefn Sidan beach near Llanelli, South Wales.

SOURCE: Steven MORRIS, 2008, Father tried in vain to dig son from collapsed dune. *The Guardian*, 5 August 2008, page 6.

MINE EXPLORER'S DEATH AS A RESULT OF BAD AIR IN A SHAFT NEAR EDINBURGH, SCOTLAND

Accidents of any kind and fatalities in particular, are exceptionally uncommon in British mines and caves. Statistics published annually in the caving magazines, such as *Descent*, demonstrate this truth. And even rarer are accidents involving experienced and properly equipped regular cave and mine explorers, on club or society events. Many of those few who get into trouble or die underground are ill-equipped or inexperienced, and exploring on their own or in similarly poorly qualified company. Much the same is true in the above-ground world of mountaineering.

It is thus especially sad to record the death, as a result of descending into bad air in a colliery shaft near Edinburgh, of Peter Ireson, aged about 27, an active and experienced member of the Grampian Speleological Group. The following details are extracted from the Group's *Newsletter*, and are reproduced here in the hope that all Subterranea Britannica members will study them carefully. We have no wish to have to record the avoidable death of one of our own members below ground.

On Thursday 17 July, GSG member Peter Ireson tied his rope to a tree and abseiled a short distance into an air shaft leading down into an abandoned coal mine at the Wisp on the east side of Edinburgh. He had a gas meter which went off indicating a low oxygen level – about 12%, but he felt fine. Concerned that the meter may have been misbehaving, he unfortunately decided to abseil a few metres more to take another reading. This plunged him into a layer of oxygen-deficient air. He realized his mistake, but it was too late and after calling for help soon lost consciousness. Despite the efforts of the other GSG member present and the help of passers-by it proved impossible to pull Pete up. A winch was borrowed from a nearby householder, but sharp edges of rock and brickwork severely abraded the rope and they had to stop.

The Fire and Rescue Service arrived promptly after receiving the emergency call, entered the shaft and supplied oxygen to Peter, raising him to the surface after about 35 minutes. He was taken to the intensive care ward in Edinburgh Royal Infirmary where he remained unconscious. The ventilator and life support was switched off on Sunday with his father and sister at his bedside.

We thank the Fire Brigade and NHS for all they did to try and save Peter, but hanging almost 45 minutes in an unbreathable atmosphere would be almost the same as being underwater for the same time and a full recovery was against the odds.

Lessons to learn:

This isn't the first time a caver has been caught out by gas when abseiling a shaft. The presence of totally unbreathable air within a few metres of the surface in an open shaft is a surprise and a lesson to all of us. Coal mines are known to be dangerous and are rarely visited by the Club as a result. The closest we normally come are the oil shale mines in West Lothian where we have measured oxygen levels dropping from the normal 21% to 18.3% as we descended. In contrast the oxygen levels down this shaft were reported to be only 5%. We don't know what other gases were present, but carbon dioxide being a heavy gas is a likely candidate.

With hindsight and time, we will learn lessons from this tragic accident, but for now, staying away from fossil fuel mines is probably the best one. If you ever want to descend a shaft and suspect problems with gas then you should, as

Pete did, take a gas meter. I'd then recommend that you lower it all the way down the shaft before you start descending. If that isn't possible, then keep it well below you as you descend, check it frequently, and descend slowly. Give it a chance to detect a change in air composition and ring its alarm before you reach the bad air. You should be prepared to switch to prussik immediately, and would also be wise to set up the pitch head to allow your companions to haul the rope up either with a Z-rig, a counterbalance or by tying the rope to a car and driving it away.

Note that it isn't only coal mines that have gas problems. There are limestone caves which can have dangerously high levels of carbon dioxide and / or low oxygen levels, though I haven't heard of any in the UK. More information on bad air and testing for it can be found on the Internet at: <http://wasg.iinet.net.au/CO2paper.html> and <http://thelances.org/hr3/badair.html>

Latest news

On 7 August, Chris Chapman reported that a squad from the Coal Authority had cleared the area around the top of the shaft and were preparing to cap it. The Coal Authority issued the following warning notice on 21 July and we were sent it by NAMHO for distribution:

Incident Alert

Shortly after entering a former coal mine on Friday 18 July 2008 [the above report cites Thursday 17], a man became unconscious due to lack of oxygen in the atmosphere. Although the emergency services rescued him, tragically he died in hospital on Sunday 20 July 2008.

Former coal mines with the associated shafts and adits are inherently dangerous environments and entry to these places should be totally avoided. Mine workings often contain atmospheres which have very little oxygen and if encountering such, will kill people very quickly after entering. Mines may also contain flammable gas which could explode causing tragic consequences to anyone within the mine workings.

There are numerous other hazards associated with old mines, including collapses of ground and the Coal Authority emphasises that these places are extremely dangerous and should be avoided at all times.

The Coal Authority is the public body which deals with surface hazards arising from past coal mining activities, such as ground collapses, open mine entries, water and gas emissions from mines and spontaneous combustion of coal. Our emergency

call-out service deals with these incidents on a 24-hour basis every day of the year. Upon receiving a report of a coal mining hazard, we will arrange for the situation to be made safe and remediate those hazards for which we have responsibility.

The Coal Authority has asked NAMHO members to report any open coal mine entrances they may find as a result of their mining research work. The report should be made to the emergency telephone response service given below. The line is manned 24 hours a day.

To report a surface hazard: Tel. 01623-646333.

The Coal Authority, 200 Lichfield Lane, MANSFIELD, Nottinghamshire NG18 4RG.

Peter Ireson's funeral on 28 July, reported in detail, was attended by around 150 of his family, friends, work colleagues, and members of the Grampian Speleological Group. Sympathy and condolences were passed from Subterranea Britannica to Peter's family and colleagues.

SOURCE: Ivan YOUNG, et al., 2008, GSG member's fatal accident in air shaft + Vale Peter Ireson – 1971 – 2008. Newsletter Grampian Speleological Group 135 (August 2008), pages 1 – 2 and 9 – 10.

SURVIVAL OF THREE-YEAR-OLD SWEEP BY FLOODWATER THROUGH A 70 METRE STORM DRAIN, CHESTER-LE-STREET, DURHAM

A cubic metre of water weighs a metric tonne. Not surprisingly, therefore, trying to push against a volume of moving water larger than you are is about as much good as trying to push back a bulldozer.

The dangers of storm-water were highlighted (again) when, in early September 2008, three-year-old Leona Baxter was, one minute, happily paddling in a puddle in a park, and the next minute had disappeared with a great deal of floodwater into a narrow concrete storm drain, followed by the family dog.

Her quick-thinking father realised the only likely course of the storm drain was to a discharge point in the river Wear, 70 metres away. He raced his unfortunate daughter to the river-bank, saw Leona floating downstream, plunged in, and rescued her. The little girl's face, arms and legs had been 'scraped raw' by the sides of the narrow concrete pipe, and she had swallowed a lot of water. She was handed up to her mother and, miraculously, was revived and is recovering well. Her exhausted father clung to the river bank for a further three minutes until emergency services, called by an onlooker, hauled him out. Sadly, the dog drowned.

An inspection and reappraisal of all such storm drains, by each local authority, would not be a bad idea. Even if this one had had a protective grating, this might not (if

vertical) have saved the girl's life. Max Sullivan-Webb, aged 17, fell into water entering a grilled storm drain at Witney (see *Subterranea* 17 (2008), page 17): the force of the moving water was so great that a second boy was unable to rescue him, or even keep his head above water, and he drowned. It would doubtless help to avoid such accidents if storm drain grilles were designed to slope gently upwards in the direction of water flow, which would make survival or rescue somewhat easier. Such grills would doubtless be more expensive, but this seems to be a clear case for the municipal bean-counters being overruled.

As is pointed out in the Chester-le-Street report, a grille fixed at the outfall end of the drain would have prevented Leona's survival.

SOURCE: Martin WAINWRIGHT, 2008, Father saves girl, 3, swept through storm drain pipe. *The Guardian*, 9 September 2008, pages 1 and 5.

NEWS – HISTORY

UNIMPLEMENTED LOWER THAMES RAIL TUNNEL SCHEME OF 1921–22 LINKING KENT TO ESSEX

Details of an unimplemented orbital railway scheme proposed in 1921–22 to link Kent, Essex and Hertfordshire with the midlands and north, by-passing central London, are preserved (LT 12/389/11) in the Frank Pick Archive at 55 Broadway. The scheme has been summarised by Tony Beard.

A standard-gauge single-track tunnel was to have been bored from Gravesend to Tilbury, with sub-surface stations at both places. From Tilbury, 50 miles of new line were proposed to run close to Pitsea, Ingatestone, Sawbridgeworth and Stevenage to Luton, with connecting lines at those places to the main radial routes from the London termini. There were to have been two portals on the Essex bank, one for trains to Luton via the route described, the other to accommodate an electric shuttle train service to and from Barking. The 'main line' was to have accommodated passenger traffic between the Channel ports and the midlands, and coal traffic from east Kent to Essex and Hertfordshire. The proposals failed to attract adequate funding, and were abandoned.

SOURCE: Tony BEARD, 2008, Tunnel vision: the Lower Thames Tunnel and New Connecting Railway. *London Railway Record* 54, 21 – 24.

RAIL WAGGON-HANDLING AT A CONSTRICTED CITY GOODS DEPOT, WHITECROSS STREET LMS, LONDON

Andrew Emmerson has thrown some light on arrangements for handling goods waggons at the Whitecross Street LMS Goods Depot, an establishment having rails on two floors on a cramped site on the northern side of the Metropolitan Railway. Locomotive-

hailed trains entered the lower level of the depot from the MR via an inwards traffic siding, where the engine was detached and the waggons were separated. A series of hydraulically or electrically operated turntables and waggon hoists was used to remove waggons from this siding to others running approximately at right-angles to it and to raise them to the street-level lines, where they were emptied. A second hoist would then lower the waggons back to the basement, where further turntables allowed them to be pushed or pulled onto a departure siding where they were reassembled into a train. The detached locomotive, having returned to the intake end of the complex, would then have been coupled-up to take the empty train away via the MR. The account is illustrated by a track diagram for this compact depot.

SOURCE: Andrew EMMERSON, 2008, Operating Whitecross Street Depot. *London Railway Record* 54, page 10.

THREE MEN IN A BOAT: THE LAST BOAT TRIP THROUGH THE UNRESTORED STANDEDGE CANAL TUNNEL, YORKSHIRE

Britain's longest canal tunnel, the 5456-yards Standedge tunnel between Diggle and Marsden, was made for the Huddersfield Narrow Canal in 1794–1811. It has no towpath, but was equipped with four passing places in its 3.1 miles. In 1846–49 the first Standedge railway tunnel was made alongside and to the south. Twelve cross-passages were made to allow railway tunnel spoil extraction via the canal. The canal tunnel was lengthened in 1893 by the construction of a road over one of the portals. Although closed to regular navigation (and subsequently gated) in 1944, the canal tunnel was retained open and minimally maintained as a means of ventilating the railway tunnel where, of course, steam locomotives were still in use. Access was usually only allowed for inspection purposes every six months.

The last recorded return trip through the tunnel, in April 1955, was reportedly made in a 'small aluminium dinghy with an outboard motor' by James Seville, John Farrar, and the Diggle stationmaster called George. A description of this trip has been published by the Newcomen Society. This is based on John Farrar's typescript 'Three men in a boat' annotated by James Seville.

The outward (eastbound) journey took three hours (an average speed of the order of one mile per hour), the low speed resulting from (fortunately temporary) engine failure and greatly reduced visibility caused by smoke from a passing loco-hauled train. The smoke had cleared for the return, which took only 90 minutes back to Diggle.

The canal tunnel has now been repaired and reopened to traffic.

SOURCE: Rosalind MAUDSLAY, 2008, Negotiating the unrestored Standedge. *Links [Bull. Newcomen Soc.]* 207, page 3. October 2008, page 10.

NEWS – MINES AND QUARRIES

MILWR TUNNEL CLOSED TO VISITORS

On 23 May 2008, the Grosvenor Caving Club was told by the water company United Utilities that 'permission to enter is withdrawn until further notice'. They are 'undertaking investigations' into the safety of the tunnel. It is part of our agreement with them that we do not enter the tunnel whilst work is in progress.

We will let those clubs who have asked for visits know as soon as access is returned. At the moment there is no appearance of work having started.

SOURCE: Stephen Brown, Access Officer, Grosvenor Caving Club.

LOCHABER SILICA MINE TO CLOSE

Tarmac confirmed in November that the 60-year-old sand mine at Lochaline, on the Morvern peninsula, is to close. The company said the decision has been caused by an acute downturn in the UK economy, rising input costs and increased competition from overseas. The closure of the mine will also mean the loss of 11 jobs.

Source: Lochaber News 20/11/2008

PLAN TO REOPEN PARYS MOUNTAIN COPPER MINE FAILS

Plans have fallen through by an Australian company to reopen the zinc and copper mine at Parys Mountain on Anglesey.

Perth-based Western Metals had been planning on bringing the mine back into production after more than 100 years. But Anglesey Mining has said talks with the company had come to an end. In April 2008, it was reported that Western Metals had agreed to pay about £14m for the Parys Mountain project, pending a feasibility review.

In a statement, Anglesey Mining said: "Following extensive discussions, no agreement has been reached with Western Metals Limited of Perth, Western Australia, in respect of the sale of the company's Parys Mountain copper-zinc-lead project in north Wales and that negotiations on this matter have now ceased."

Before mining ended at Parys Mountain in the early 1900s, it yielded more than 300,000 tonnes of metal. Mining at the site is said to go back to the Bronze Age.

BBC News 13/10/2008

KELLY MICACEOUS HAEMATITE MINE, DEVON

The surviving surface buildings and plant of a small mine worked on and off during the years 1797-1952 for micaceous haematite (an iron ore) used for the manufacture of mineral pigments have been preserved and made publicly accessible. Preservation work at the

mine, near Lustleigh, has been undertaken by the Kelly Mine Preservation Society.

ANON, 2008, Kelly Mine Open Day. *Industrial Archaeology News* 146, page 14

PLANNED RESTORATION OF WHEAL TREWAVAS COPPER MINE ENGINE HOUSES, CORNWALL

The National Trust has acquired a 30 acre cliffside site at Mounts Bay in the Tregonning and Trewavas District in Cornwall. This includes the two Grade II listed engine-houses, mine-shafts, stacks, flues, and work platforms of the Wheal Trewavas mine, where up to 200 men extracted 17,000 tons of copper ore in the years 1834-46. Some minor re-working appears to have taken place (the mine then being known as New Penrose) in 1879. The Trewavas mine worked four lodes, in part below the bed of the sea. It resembles the similarly protected better-known Botallack and Levant mine sites. The mine site as a whole is Scheduled as an Ancient Monument, and falls within the Cornish Mining World Heritage Site.

Cornwall County Council's Historic Environment Service has completed an archaeological and historical assessment of the site. The two engine-houses (from which the Cornish beam engines have long-since been removed) are in a dangerously derelict condition, and precariously sited on the cliff edge. Their restoration is proposed to be completed by 2009. Enhanced safe public access is envisaged.

The Wheal Trewavas site also includes the building bases of a World War II Chain Home Low radar station.

Half a mile to the north, the National Trust has already (in 1970) preserved the engine-house of the Wheal Prosper mine at Rinsey. This worked tin from an inland extension of the same four lodes in the 1860s.

SOURCE: Graham THORNE, 2008, A cliff top Cornish mine saved by the National Trust. *Industrial Archaeology News* 146, pages 1 and 8 - 9

UNDERGROUND BUILDING-STONE QUARRIES FOR BATH STONE AT COMBE DOWN, BATH & NE SOMERSET

Completed and proposed work in connection with the stabilisation of 23.7 hectares of underground building-stone quarries at an average depth of five metres below Combe Down, to the south of Bath, is reported. Some infilling of the Byfield and Firs quarries (legally mines) is to be followed by extensive work at Grey Gables mine (to the northeast of Shaft Road) and at Mount Pleasant mine (to the southeast.) As Greater and Lesser Horseshoe Bats (protected species) inhabit Grey Gables, provision is being made for them. A 'bat flyway' cut-and-cover 2.4m-diameter tunnel formed of pre-cast concrete rings is to be formed to link the Grey Gables and Mount Pleasant mines, with an additional 18m metres

of bored tunnel in virgin rock. All work will be subject to stringent environmental controls, as the site lies above an important aquifer.

An air flow will be maintained through the linked mines, by way of a new 2.5m-diameter shaft sunk at the north-west end of Grey Gables and an existing shaft at Mount Pleasant. Another existing shaft, in Grey Gables, is to be capped with a manhole cover and set aside as a bat incubator.

As a result of extensive pillar-robbing, the extraction ratio in these underground quarries is of the order of 80%, whereas 70% is usually considered to be the safe limit. Quarry stability is also prejudiced, especially near the edge of the Combe Down plateau, as the quarried limestone has been affected by cambering at the valley sides, resulting in the formation of open tension-joints or gulls, which are an added complication for the civil engineers working on this scheme.

SOURCE: SCHÜNMANN, Damon, 2006, Tunnelling Bath's nature trail. *Ground Engineering* 39(8), 14 - 15.

POSSIBLE REOPENING OF HARWORTH COAL MINE (NEAR DONCASTER), NOTTINGHAMSHIRE

UK Coal's Harworth mine near Doncaster, mothballed for two years or so, may be re-opened as a result of rising fuel prices. Reopening would cost an estimated £175m, and open up reserves of 25m to 40m, tonnes, from which an output of 2.2m to 2.3m tonnes per annum could be expected.

SOURCE: Mark MILNER, 2008, UK Coal raises output to capitalise on higher prices. *The Guardian*, 29 August 2008, page 26.

COAL-MINING ON CANNOCK CHASE, STAFFORDSHIRE

A lecture by Dennis Jackson of the Cannock Chase Mining Historical Society, reported by Jim Andrew, has offered an overview of coal extraction in this part of Staffordshire.

Coal is known to have been discovered here, at outcrop, by the beginning of the 13th century. Early 'deep' mining, to depths of the order of six metres, was apparently by 'bell-pits.' Later, shafts were sunk to seams at depths of 37 metres or so. Much difficulty was encountered as a result of water entering the mines from the water-bearing overlying Triassic sandstones. Industrial-scale development of the coalfield followed the introduction of pumping engines, and of canals to transport coal to market. Shafts reached depths of around 500 metres.

Advances in prospecting methods revealed an estimated 400 million tons of coal reserves beyond the coalfield's eastern boundary fault. Production reached a peak of 5.76 million tons per annum in 1913, when the workforce had reached 20,400.

Post-nationalisation development included the development of several large mechanised collieries, such as Lee Hall near Rugeley, which reached an output of 1m tons per annum. Ground-freezing was introduced to facilitate shaft-sinking through water-bearing strata.

The coalfield is no longer worked: West Cannock mine closed in 1982, Lee Hall in 1990, and Littleton in 1993.

SOURCE: Jim Andrew, 2008, 800 years of coal mining on Cannock Chase. Links [Bull. Newcomen Soc.] 207, page 11.

GEOLOGY AND COAL-MINING IN THE LUNE AND UPPER RIBBLE COALFIELDS, LANCASHIRE / YORKSHIRE

The latest monograph published by the Northern Mine Research Society, *British Mining* 85, reviews the geology of the small Lune and Upper Ribble coalfield in the light of recent geological mapping by the British Geological Survey. This was an area of small-scale collieries whose products were primarily for domestic use, and for small-scale local industrial enterprises including forges, brick-making, lime-burning, and steam-powered mills. Most of the mines had closed by the mid-19th century, although those in the Ingleton area remained in production until 1935.

The text is supplemented by numerous geological maps and sections, and some photographs of exposures. An attempt is made to explain the distribution of the mined seams. The chapter on mining considers the adits, shafts, drainage and ventilation arrangements, production, and end-uses of the coal. There is a four-page list of references to published work, and a four-page index.

SOURCE: Michael KELLY, 2008, Geology of the Lune and Upper Ribble coal fields. *British Mining* 85: 84pp [ISBN 978-0-901450-64-7] [Available from Barbara Sutcliffe, NMRS Publications, The Old Manse, 93 Halifax Road, NELSON, Lancashire BB9 0EQ (T) 01282-614615 / Email mansemains@btopenworld.com]

PROPOSED GOLD MINE AT CLONTIBRET, COUNTY MONAGHAN, REPUBLIC OF IRELAND

The results of deep drilling and sampling gold-bearing rocks below Clontibret, near the Northern Ireland border, have reportedly encouraged Professor Richard Conroy, an experienced oil, metals and gems prospector of 'Conroy Diamonds & Gold', that commercial gold-mining could be viable in County Monaghan. The price of gold has risen six-fold in recent years, now standing at over £450 per ounce. An estimated million ounces of the precious metal, in tiny grains scattered through a vast bulk of rock from which it would have to be separated, are thought to lie at depths of several hundred feet. Mining and extraction could well amount to around two-thirds of the value of any metal recovered.

SOURCE: James TOZER, 2008, O'Klondike! Stand by for a new gold rush as a glittering lode worth £450 million is found under a tiny Irish village. *Daily Mail*, 2 July 2008, page 19.

NEWS – MISCELLANEOUS

MAFIA TUNNELS & UNDERGROUND SHOOTING RANGE FOUND IN PALERMO

Italian police have found a warren of passages beneath a housing estate in Palermo's notorious Zona Espansione Nord district home of the city's top mobster, Salvatore Lo Piccolo, known as the Baron, until his arrest last year. Police have found a firing range littered with 9 x 21 calibre ammunition - the Italian mobster's favourite.

Sara Fascina, the police commander whose officers discovered the complex, said it also seemed to have been used for hiding fugitives and providing them with an escape route in the event of a raid. "The housing blocks that make up the Zen are strongholds that are impossible to enter unobserved," she said.

The officers came across the shooting range by chance. While searching the flat of a suspected drug dealer, one officer noticed a large bunch of keys and asked what they were all for.

They found what appeared to be a shed in the courtyard, with an entrance opened by remote control. From there, they descended to an armoured door beyond which was a refuge for fugitives, complete with TV, air conditioning and 7,000 Euros in cash.

When another security door was forced open the police found themselves navigating some 100 metres of passageways circling the foundations of the block. At the end of the last passageway was the firing range - 10 metres long and sound-proofed.

SOURCE: *The Guardian* 27.11.2008

CAR MANUFACTURE RECOMMENCED AT LONGBRIDGE

The MG Rover car plant at Longbridge, southwest of Birmingham, closed in 2005 with the loss of 6,000 jobs. The site was purchased by the Nanjing Automobile Corporation, with a view to recommencing manufacture. It has been reported that car deliveries from the plant recommenced on 11 September 2008. To what extent, if at all, the numerous tunnels under the factory are to be reused is not reported (see Neil WEDGBURY, 2007, *The Austin-Longbridge underground & its culture. Bull. Subterranea Britannica* 32, pages 3–30 also this issue, page 53.)

SOURCE: Mark MILNER, 2008, Longbridge delivers cars again after a three-year gap. *The Guardian*, 12 September 2008, page 32.

FIREPROOF BUNKER FOR VATICAN LIBRARY

A planned refurbishment of the Vatican Library will include construction of a fireproof bunker for manuscripts and a climate-controlled room for precious papyrus fragments.

The manuscript bunker will be reconstructed with fireproof walls, flooring and pavement and an emergency exit will be added. New technology will monitor climate and humidity, and a security system also will be installed.

A connected smaller room will house the Vatican's collection of original papyrus manuscripts, with additional security and climate control.

SOURCE: *Catholic News* 15.8.2008

UNDERGROUND WEDDING

Gilly Woodland and Alan Duckworth exchanged vows at Kents Cavern in Torquay, Devon where some of the oldest evidence of man's occupation of Britain has been found. Flint hand-axes found in the caves were dated at 450,000 years old and the oldest remains of animals found there are from cave bear dating back to around 500,000 years ago.

Ms Woodland, 49, a media marketing manager, and Mr Duckworth, 38, a network design manager, both from Torquay, married in a civil ceremony. Over 80 guests were ferried to the caves complex by vintage bus before going underground for the ceremony.

The civil wedding took place in one of the huge caves, followed by a cocktail party in another complete with live music. Instead of a wedding cake, the couple tempted guests with a pile of different cheeses - with figurines of a cave man and cave woman on top.

Source: *Sky News* 4/10/2008

NEWS - PUBLICATIONS – BOOKS

CHARLES TYSON YERKES [1837 – 1905] AND THE UNDERGROUND, LONDON

We owe to Charles Tyson Yerkes [1837 – 1905] the Bakerloo, Northern, and Piccadilly tube lines of the London Underground, the electrification of the pre-existing sub-surface London railways, and the third rail system still in use throughout the railways of southern England.

Yerkes was born in Philadelphia, and made a fortune in that city before being imprisoned for fraud there in 1871. He moved on to Chicago, where he made a second fortune and was ultimately responsible for 40 miles of elevated electric railway, 47 miles of cable tramway, and 432 miles of conventional electric railway. However, his business methods, not to mention his private life, were highly questionable, and he thought it best to leave the city.

London beckoned in 1900, offering rich pickings for a sophisticated financier who noted the UK's slowness in applying electricity to transportation. Here, horse-drawn buses and trams and steam-hauled trains still reigned supreme. Steam trains in tunnels, as on the District and Metropolitan lines, were proving unpopular. Such electrification as the UK had ventured was limited to short lines, such as the City & South London Railway (1890), the Liverpool Overhead Railway (1893), and the Waterloo & City line (1898.) Electrification of the Mersey Railway (1903) followed. Yerkes was quick to appreciate the benefits of electric traction for railways in tunnels (even the Liverpool Overhead included a section in tunnel). More daring advances in electrification were being made in both Germany and Hungary.

He bought up the London United Tramways; electrified the District line; and with American finance commenced the tube lines which, extended, we know to day as the Bakerloo, Northern and Piccadilly lines; and built Lots Road power station, at the time the largest in the world. However, he died in New York in 1905 before the first parts of any of the tube lines commenced public service in 1906 and 1907. The development of underground lines in deep tunnels was, of course, in contrast with his Chicago operations.

A ruthless manipulator of civic officials and investors, and a serial womaniser, he was little lamented at his death. Published British obituaries were 'tastefully euphemistic to the point of rendering him unrecognisable' but one in Chicago referred to him as 'The greatest robber-baron' that city had ever seen, 'a five-star, aged-in-oak, 100-proof bastard.' The coffin at his funeral 'was preceded by two carriages filled with security officers, and followed by six beneficiaries of the will ..' with scarcely a tear of genuine sorrow shed – not even by the family.' He is buried in his own self-designed mausoleum at Greenwood Cemetery in Brooklyn. Possibly accountants and lawyers did better from the disposal of his assets than investors, lady-friends, and family.

DETAILS: Tim SHERWOOD, 2008, *Charles Tyson Yerkes: the traction king of London*. Stroud: Tempus Publishing: 157 +(3) pp [ISBN 978-0-7524-4622-4]

£16.99

THE WEALDEN IRON INDUSTRY IN KENT, SURREY AND SUSSEX

Iron ore was mined, and iron smelted, in the former 'Black Country' of England in the three south-eastern counties from Roman times to the early 19th century. Members of the Wealden Iron Research Group, and especially Jeremy Hodgkinson, have spent over 30 years researching the archaeology of iron-works sites, and related archival records. A new book reviews the industry in the light of this modern research.

The first chapter deals with the geology and raw materials of the Weald, and concludes that ore was mainly extracted from open-cast excavations, and what have historically been known as 'mine pits' which appear today as depressions (often now ponds) in woodlands. What limited evidence has come to light for the nature of these mine pits suggests them to have been deep nearly vertical-sided shafts, up to 12 metres deep and five metres wide, with no or minimal undercutting at their bases. They appear, therefore, not to have been 'mines' in the sense of truly underground workings.

The bulk of the book deals with ore-processing, and iron-smelting and casting, and the products of the trade, for which aspects very much more archaeological and documentary evidence survives. There is an interesting brief reference to iron working in the Pays de Bray, between Dieppe and Beauvais in France, an area which is geologically an extension of the Weald.

There are numerous illustrations, some in colour, a list of blast furnace and forge sites (eight pages), a select bibliography (six pages) and an index (five pages).

DETAILS: Jeremy S. HODGKINSON, 2008, *The Wealden iron industry*. Stroud: Tempus Publishing: 160pp [ISBN 978-0-7524-4573-1]

ARCHAEOLOGY OF WORLD WAR I IN MAINLAND EUROPE

A very well illustrated and accessible account of the archaeology of the World War I battlefields has been published, one of the co-authors (Alain Jacques) being well known to *Subterranea Britannica* as the City Archaeologist of Arras who has conducted some of us around the extensive chalk tunnel systems under the town.

The book contains numerous contemporary and modern photographs of trenches, munitions, the dead or their skeletons, objects such as badges, bottles, and buttons and even tanks, bunkers, dug-outs, and of course the 'subways' at Arras, dug by the British to link previously isolated man-made cavities in the chalk to form a protected communications system from the town to the front. The contemporary graffiti on the subway walls are also shown.

The work, even for those with little or no French, is a most accessible introduction to the battlefields, and includes helpful maps relating the front line (as it was from time to time) to the Belgian – French border, and to towns and other places of note.

DETAILS: Yves DESFOSSÉS, Alain JACQUES, and Gilles PRILAUX, 2008. *L'archéologie de la Grande Guerre*. Editions Ouest-France: 128pp [ISBN 978-2-7373-4568-5] [15 Euro]



BOX FREESTONE MINES REPRINTED

Box freestone mines, published in 2002, has been reprinted. The 73-page A5 book contains four colour-printed maps, seven colour photographs, and 19 black-and-white illustrations. It is available, postage included, at £ 7.95 from Cotham Caving Group (to whom cheques should be made out), c/o Sunny Hill, Sea Mills, BRISTOL BS9 2NG.

DERELICT LONDON

This odd little book consists of photographs of abandoned and derelict buildings and structures and even a milk float, each with a page of descriptive and informative text. Sites of particular underground interest include public toilets, Sydenham Hill Wood railway tunnel portal, Down Street Station, Aldwych Station, the Citadel at Horse Guards Parade, Second World War air-raid shelter signs, and the surface buildings of the World War II deep air-raid shelters at Goodge Street and Stockwell

Paul TALLING, 2008, *Derelict London*. London: Random House Books: 224pp [ISBN 798-1-905-21143-2] [On sale at £ 9.99 at the British Library's bookshop]

NEWS - PUBLICATIONS – PERIODICALS

CHELSEA SPELAEOLOGICAL SOCIETY RECORDS 34 (2008): CAVES AND TUNNELS IN SOUTH EAST ENGLAND PART 18

The latest part of Harry Pearman's long-running gazetteer of underground sites in 'southeast England' has been published as Volume 34 of *Records of the Chelsea Spelaeological Society* and (also) as the *Annual Report for 2006/8 of the Kent Underground Research Group*. It includes the following principal contents:

Braeside Crescent, Bexleyheath, Kent – subsidences

Canterbury Cathedral, Kent – great drain

Chalk mining, Hertfordshire, Kent and Surrey – early 19th-century

HMS Wildfire, Chatham, Kent – bunker

Cliftonville, Kent – tunnels & Hangman's Wood, Essex – deneholes

Park Place, Berkshire – tunnels

Snape Wood ironstone mine, Wadhurst, East Sussex - 19th-century mine

Strood, Kent – chalk adits

Surrey - mines – a 17th / 18th century source

These are accompanied by numerous shorter entries for a variety of air-raid shelters, bunkers, chalk adits, chalk mines, chalk wells, holy wells, subsidences and tunnels. The volume contains numerous admirably clear full-page location maps and site plans and sections.

DETAILS; Harry PEARMAN (ed.), 2008, *Caves and tunnels in South East England*. Part 18. *Records Chelsea Spelaeological Society* 34: ii + 47pp.

Copies of Part 18 may be ordered at £15 each (inclusive of postage and packing) from John Cooper, Records Officer CSS, 31 Elm Close, WELLS, Somerset BA5 1LZ, who can also supply details of availability of all earlier issues of *CSS Records*.

NEWS - TUNNELS AND TUNNELLING

BLACKFRIARS UNDERGROUND STATION CLOSED NEXT YEAR FOR REDEVELOPMENT, LONDON

Blackfriars underground station will close in March 2009 for redevelopment work. District and Circle Line trains will pass through without stopping. Re-opening is scheduled for late 2011.

SOURCE: ANON, 2008, Blackfriars tube station shut for redevelopment. *Modern Railways* 65(720), page 10.

TEMPORARY LINE CLOSURE BETWEEN FARRINGTON AND MOORGATE STATIONS, LONDON

First Capital Connect trains (formerly Thameslink) will not be calling at Barbican and Moorgate Stations with effect from 1 March 2009. The temporary closure of lines from Farringdon to Moorgate is to allow the 'Thameslink' platforms to be lengthened southwards to accommodate 12-car trains, rather than the present 8-car formations. The platforms cannot be extended northwards because of the falling gradient at the north end of the station.

SOURCE: ANON, 2008, Closure of widened lines between Moorgate and Farringdon. *London Railway Record* 57, page 138.

CLOSURE OF ST. MARY'S JUNCTION BETWEEN HAMMERSMITH AND CITY & DISTRICT LINES and EAST LONDON LINE

The physical link between the East London Line at Whitechapel (which is to be operated as a part of 'London Overground' instead of London Underground as hitherto) and the Hammersmith & City Line at Aldgate East has been severed. The link has had no passenger services since World War II, but was retained until summer 2008 to allow London Underground's East London Line stock to be transferred elsewhere. Some historical details for this inter-line connection have been supplied by Michael Smith.

SOURCE: ANON, 2008, St. Mary's Junction. *London Railway Record* 57, 138 – 139.

SOURCE: Michael J. SMITH, 2008, St. Mary's Curve. *London Railway Record* 57, page 144.



FIRE IN THE CHANNEL TUNNEL, ENGLAND / FRANCE

A fire was detected on a lorry aboard an eastbound train in the Channel Tunnel's north tunnel, about 11 kilometres short of the French portal at about 15.00 on Thursday, 11 September 2008. Three other shuttles in the tunnel at the time were sent back to their countries of origin, and 32 persons (mostly lorry drivers) were evacuated via the service tunnel. There were no Eurostar passenger trains in the tunnel at the time.

The south tunnel was reopened for traffic on 12 September, with passenger trains recommencing on 14 September, when a reduced service was reinstated.

Presumably the fire had already started before the lorry entered the tunnel on the shuttle, apparently in the brakes. Rubber lorry tyres, and fuel tanks, seem to have been the main cause of the conflagration. The fact that open-sided shuttle cars are used, allowing any smouldering material to burst into flames in the slipstream, has been criticised. One load near the fire consisted of the highly toxic (and also flammable) chemical phenol, or carbolic acid, although this unpleasant material appears, fortunately, not to have escaped or caught fire.

The November issue of *Modern Railways* reported that two sections of the north tunnel were reopened by 29 September. From 1 October there were 210 trains scheduled per 24 hours, including 55 – 58 Eurostar paths. Eurostar trains to and from Brussels (nine each day rather than 10 as before the fire) and Paris (16 rather than 17) are almost back to their pre-fire frequency, with journey times extended by about 20 minutes. There are 98 scheduled lorry shuttles each weekday (34 at weekends), and 30 car shuttles (52 at weekends). Additionally, through freight trains run at night. The Eurostar tunnel transit times were observed to be 30 minutes instead of the usual 20 minutes on 17 and 20 October.

SOURCE: Sam JONES, Dan MILMO, and Lizzy DAVIES, 2008, Thousands stranded after Channel Tunnel fire. *The Guardian*, 12 September 2008, page 4.

SOURCE: Sam JONES and Dan MILMO, 2008, Channel Tunnel fire: north line to be closed for months. *The Guardian*, 13 September 2008, 14 – 15.

SOURCE: ANON, 2008, Major fire disrupts traffic through Channel Tunnel. *Modern Railways* 65(721), page 6.

SOURCE: ANON, 2008, Eurostar service close to normal, as tunnel fire investigation goes on. *Modern Railways* 65 (722), page 10.

PROPOSALS FOR NEW TUNNELLING UNDER LONDON

Both Peter Monk and Charles Gilman, in letters in 2006, suggested or commented on suggestions for new or extended railway tunnels under London.

Peter Monk comments that extending the Docklands Light Railway from Bank to Farringdon, as had been suggested, would be a challenging civil engineering task, if not impracticable. The single-bore reversing siding to the north of DLR Bank passes a few metres below the Northern (City) Line tunnels below Princes Street and Moorgate, terminating near the junction of Gresham Street and Princes Street, where there is a ventilation shaft. Northwards from this, the Northern Line tunnels 'roll over' below Moorgate, resulting in the northbound and southbound tunnels being reversed east-west between Bank and Moorgate, taking them deeper at the point where once crosses above the other. Any DLR extension tunnel would thus have to go deeper still, with the risk of breaking through the base of the London Clay into the pervious beds below, which contain water under artesian pressure.

Charles Gilman presented thoughts on extensions and connections for the isolated Waterloo & City Line tunnels. A junction with the DLR at Bank is ruled out, as there is a loading gauge mismatch. Instead he advocates diverting and extending the Waterloo & City tunnels to a new subsurface station below the (in 2006) soon-to-be closed Eurostar station basement at Waterloo, bringing them to surface to link with the Windsor lines beyond the high-level platforms. The disused high-level Eurostar platforms, he suggests, could accommodate long-distance trains from Bournemouth and Southampton. At the other end of the Waterloo & City, he suggests an extension from Bank to Liverpool Street, with services running to and from Hackney Downs.

SOURCE: MONK, Peter, 2006, DLR in the City. *Modern Railways* 63(695), page 29.

SOURCE; GILMAN, Charles, 2006, DLR in the City. *Modern Railways* 63(695), page 29.

TUNNELLING UNDER A RAILWAY LINE WITHOUT INTERRUPTING THE TRAIN SERVICE, LB CROYDON, GREATER LONDON

A short (37m) road tunnel has been driven below an operating railway without affecting rail traffic at Smitham Station (London Borough of Croydon) on the Purley to Tattenham Corner branch line. This is to accommodate the A23 Coulsdon bypass (Farthing Way.) To create the tunnel, an 8,500 tonne concrete box, 37m long, 25m wide, and 10m high, was jacked through the railway embankment which proved to be mostly chalk, with some gravelly clay and flints near the top. During the work, which took three weeks, the former station subway linking the two platforms was replaced by a footbridge with lifts for disabled access.

SOURCE: Mark HANSFORD, 2006, Tunnelling: it's come to pass. *Ground Engineering* 39(8), page 20.



The Tar Tunnel in the Severn Gorge

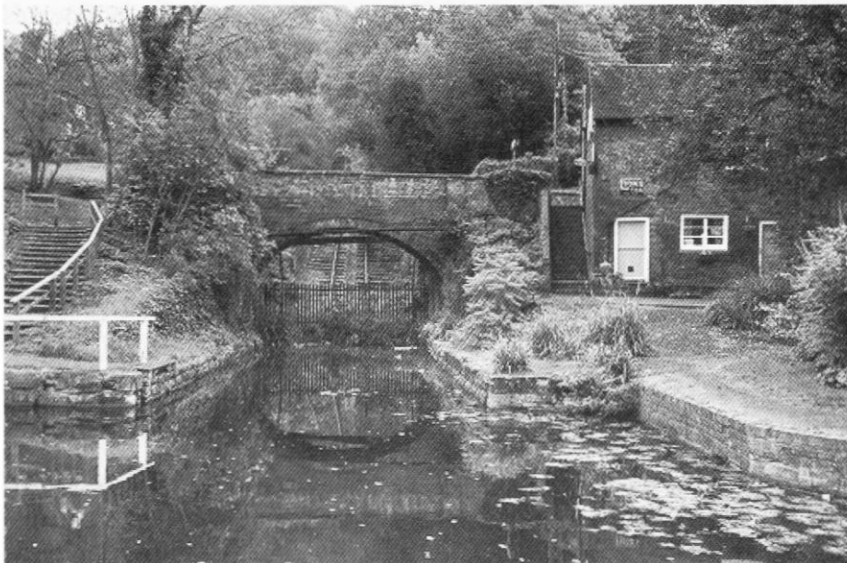
Sophie Heath

Curator – Coalport China Museum and the Tar Tunnel

Ironbridge Gorge Museum Trust

“On the Northeast bank of the river ... is a tunnel cut in the side of a Mountain ... which is about 1040 yards long and into which we penetrated about 760 yards – in this gallery or tunnel Petroleum is found which drips through the grit into a small rill of water from the top of which it is collected. ... This Gallery communicates with a coal mine of considerable depth. About 100 yards from this last place is a Porcelain Manufactory lately established.”¹

This 1796 description of the Tar Tunnel by Charles Hatchett, a young man with geological and scientific interests, is one of many contemporary travel accounts that mention the new and dramatic excavation in the Severn River Gorge where a tar-like substance exuded from the walls, initially at a rate that filled many barrels a day.



Hay Inclined Plane - The entrance to the Tar Tunnel is within the building on the right

The man-made and natural aspects of the phenomenon of the Tar Tunnel are both connected to the rich coal deposits in the Ironbridge Gorge. Mining of shallow coal deposits was carried out in this river valley from the mid-16th century onwards. By the 18th century the River Severn was a trade highway transporting coal and the products of a flourishing iron-smelting industry to markets downstream and overseas. In 1779 the famous Iron Bridge opened as a massive advertisement for this trade and the industrialisation which supported it and the Gorge became a destination for sightseers. Yet the early coal measures that had enabled this development were becoming exhausted, so a new era of deep mining at the other end of the Gorge commenced. It was as part of this development that a tunnel was driven into the side of Gorge uncovering a rich flow of natural bitumen that made the Tar Tunnel an asset resource in its own right.

Early Exploitation of the Gorge

The Northern bank of the River was owned and developed by leading local industrialists the Reynolds family. William Reynolds took over his family's iron-smelting concerns in 1780 and quickly proved himself an able and ambitious developer of these activities. Work on the first deep mining shafts at Blists Hill on the plateau above the river gorge began in the 1780s. These were the first of many mines that were to yield not only coal but important seams of ironstone, fireclay, and brick and tile clay. Reynolds very quickly seems to have started work on a substantial transport infrastructure focused on these deep mines which would enable their products to be efficiently moved into trade and transport networks.

Waterborne transport was far preferable to road haulage in the difficult terrain of the Gorge and a canal network was established connecting the new mining concerns at the top of the Gorge. In the late 1780s Reynolds commissioned work on an 'inclined plane' to connect the businesses. This settlement was named Coalport – clearly indicating its destiny as an entrepôt for the new coal reserves onto the River Severn. In 1796 the famous porcelain factory which takes its name after the place was founded here, as Charles Hatchett observed.

Tar Tunnel origins

It seems likely that the Tar Tunnel was Reynolds' first solution to the access problem from mines to river as this tunnel from the riverbank at what became Coalport was begun in 1787,



Passing place. Photo by Nick Catford

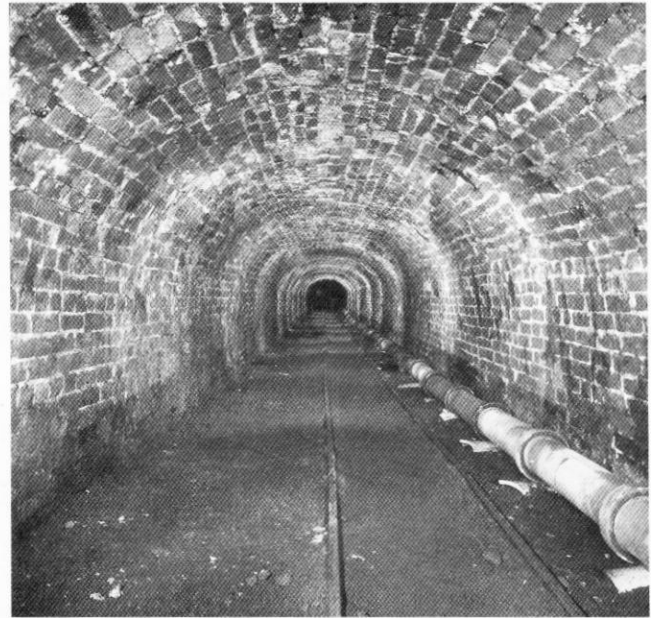
well before work started on the lower canal or the Incline. It was reported in local newspapers of June 1787 that the tunnel had been intended as a drainage outlet for the Blists Hill works and, strikingly, as a navigable waterway for movement of goods.² This vision is not set out in any written or sketched plans but underground canals were by no means unheard of and Reynolds himself was simultaneously engaged in the construction of canals at Wombridge and Ketley which included subterranean sections. In any case excavation commenced of a tunnel which was heading in a clear straight line towards the Blists Hill shafts still being sunk into the coal measures. However the workmen had only progressed 300 yards into the hillside when they hit upon the natural 'tar' reserve that gives the tunnel its name. Attention at once turned to collection and exploitation of this resource which at first poured out at an enormous rate.

The Tar – its substance and uses

Tar is correctly a term for the substance obtained from heating coal whereas the exudation found in the Tar Tunnel is a naturally liquid hydrocarbon fraction – a natural bitumen or mineral oil. This, like the coal deposits nearby, has developed from the decay and compression of ancient plants and animals.³ Through earth movements and the action of gravity the bitumen has flowed into and impregnated a porous sandstone layer of the hillside. Gravity likewise causes it still to seep out into the Tunnel void today. Other bituminous springs are known in the local area but none ever approached the Tar Tunnel in productivity. In the late 1930s the D'Arcy Exploration Company carried out extensive prospecting with this in mind but found nothing worthy of commercial exploitation.

It is clear that Reynolds understood not only the usefulness of this discovery but its potential uniqueness. A letter dated December 1787 from Samuel More at the Society of Arts to Abraham Darby III, Reynolds' fellow local ironmaster, includes the line 'Tell William Reynolds I have made some trial of the native tar'.⁴ Reynolds, who had his own laboratory at home, seems to have tasked More with carrying out some independent experiments. The letter goes on to explain that the sample is quite different in nature from the tar obtained as a distillate of coal. The unusual origin of the substance no doubt supported its sale as a medicinal preparation – Betton's British Oil was sold as a soothing treatment for 'rheumatic and scorbutic affections', the latter referring to skin complaints. It is not known when the playwright Charles Dibdin (1745-1814) visited the Tar Tunnel but his account describes large cauldrons set into the ground about the entrance to the tunnel into which the tar was directed via large iron pipes and boiled to purify it.⁵ The tar itself Dibdin describes as 'about the consistence of treacle, and beautifully pellucid' ie. translucent. The majority of the tar was used to weatherproof hemp ropes and for caulking boats; rope-making and boat-building were both important local industries.

The Tunnel quickly joined the Iron Bridge and the smelting furnaces as sights on the itinerary of tourists seeking out the awe and romance of the industrial landscape. For some it captured the gothic imagination. Carlo Castone della Torre di Renzimonio Comasco was an Italian nobleman who visited England in 1787. The approach to Coalbrookdale with its smoke, steam and furnaces struck him as a descent into hell; while on the Tar Tunnel he wrote:



The Tar Tunnel showing the narrow gauge track and ventilation pipe. Photo by Nick Catford

"I also desired to see the fountain of liquid pitch discovered a few months ago in digging a coal mine. I entered the large cavern which led to it. The vault is entirely of brickwork, and so appears in great part. At length we arrived at the rock whence emerges the pitchy torrent in such copiousness that five or six barrels are filled with it every day. The workmen who gather the pitch are, of a truth, like the imps described by Dante in his Inferno as gathering with a hook the souls of the damned into a lake of pitch – so horribly disfigured and begrimed are they."⁶

The heyday of the Tar Tunnel

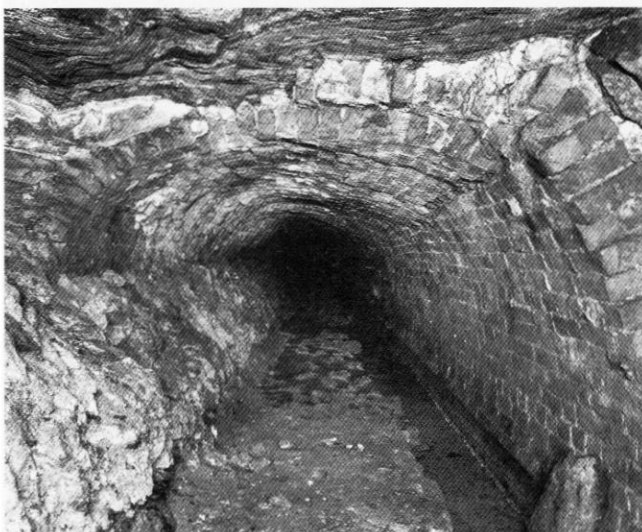
For the first five years the flow of tar was reported to approach 1,000 gallons a week but even by 1793 the rate was observed to be falling off. By 1824 it was much reduced with the annual production of the tunnel put at 10 barrels or 360 gallons in all. Through the 1830s the output hovered around six barrels a year and 1843 is the last year the Tar Tunnel is given a line in the accounts of its owners, the Madeley Wood Company.

At some point after all the excitement over the discovery of the tar spring the progress of the Tunnel towards the mine works was continued. We know that by 1796 a railway track for running wagons was laid in the tunnel and certainly by 1801 quite considerable quantities of coal were being brought out from the works in horse-drawn wagons via this route. In 1850 considerable sums were

spent on repairing the Tunnel as new mine shafts were sunk at Blists Hill.

By 1870 only the uppermost seams of coal were still being worked at Blists Hill – 430ft down where the shaft reached 607ft at its deepest. After 1890 it seems that the mine was only worked for clay, and on a much smaller scale. The mine continued to be worked into the 1930s, when the Tunnel (as part of the ventilation system of these pits) was still walked as part of the mine maintenance checks.

It seems that the use of the Tar Tunnel as a transport route probably ceased in the mid-19th century. The railway came to the area at around this time, replacing the canals and the river as the main mode of transport. During the Second World War the Tunnel entrance was used as an air-raid shelter. After this the Tar Tunnel fell out of common knowledge until 1964 when the Shropshire Mining Club followed a hunch and obtained permission to explore beyond a door in the cellar of the Coalport Village Shop.



Beyond the public tour, the tunnel has collapsed.
Photo by Nick Catford

The Tar Tunnel today

It is a testament to the quality of the original construction that the Tar Tunnel survives almost intact. For the first 800 feet of its length the Tunnel has a brick arch about six foot high in the centre and roughly the same across. In the very first section a second brick lining has been inserted beneath the first, lowering the ceiling at this point. The iron trackway that was used to run carts of coal and other goods through the Tunnel remains underfoot. A drainage pipe carries water to the entrance on the right-hand side. Also on the right are a series of openings through which can be glimpsed tar pools, five in all. These are large shallow chambers likely to date from the early 19th century when it became necessary to collect the tar to harvest it efficiently. These might have been tapped at the chamber itself or the tar may have been allowed to spill into a running water channel and float to the entrance for collection, as Charles Hatchett appears to describe in the opening quotation.

At 815ft the Tunnel opens out to double width to allow a passing point for loads going in opposite directions. Between 875ft and 1,390ft the Tunnel passes through naked rock with some very colourful mineral deposits on the walls. After this the brick lining resumes and is continuous once more but the dimensions of the Tunnel shrink considerably to around three feet in diameter. At 1,485ft there is a junction, skilfully vaulted in brick. The side passage almost certainly links to the Blists Hill Lower Shaft but it is now blocked by a roof fall about 43ft from the junction. The Tunnel, now more of a culvert, continues to narrow and beyond 2,240ft it is not possible for a person to pass. The straight path of the Tunnel is preserved throughout and should it continue 725ft further it would reach the Blists Hill Upper Shaft. Tar seeps through the brickwork and rock at all points along the Tunnel, even very far up. Local miners believed it continued further to other pits in the Madeley area but no survey has been able to verify this.

Today this unique underground structure is part of the Ironbridge Gorge Museum Trust which was founded in 1968 to preserve and interpret the rich industrial history of the area. Between March and October the Tunnel is open to the public who are able to walk about 30ft along its length; two of the tar pools are visible from this section. Outside the dramatic remains of the Hay Inclined Plane and part of the Coalport section of the canal, restored by the Museum after it was filled in in the 19th century, hint at the transport hub that the Tar Tunnel was once at the centre of. Blists Hill has also been restored and reconstructed as a Victorian working town by the Museum and a large investment project in this site, due to be completed in 2009, includes a mine experience that will bring to life another part of this important story.

(Underground photos taken during 1985 Sub-Brit Study Weekend.)

Sources

Brown, I.J. 1967, *The Tar Tunnel*, Shropshire Magazine, May
Brown, I.J. and B. Trinder 1974, *The Tar Tunnel Coalport*
Didyk, B., B.R.T. Simonett, and G. Eglinton 1984, 'Bitumen from Coalport Tar Tunnel', *Organic Geochemistry*, Vol.3, No.3, pp.99-109
Randall, John 1882, *The Severn Valley* and 1880, *A History of Madeley* (NB. JR's works contain some inaccuracies)
Trinder, B. 1988, *The most extraordinary district in the world: Ironbridge and Coalbrookdale*, Phillimore, Chichester

- 1 Raistrick, A. (ed.) 1967, *The Hatchett Diary*, pp.109-10.
- 2 Hadfield, C. 1966, *Canals of the West Midlands*, pp.152-155.
- 3 Didyk, B., B.R.T. Simonett, and G. Eglinton 1984, 'Bitumen from Coalport Tar Tunnel', *Organic Geochemistry*, Vol.5, No.3, pp.99-109.
- 4 Quoted in Brown, I.J. and B. Trinder 1974, *The Coalport Tar Tunnel*.
- 5 Trinder, B. 1988, *The most extraordinary district in the world: Ironbridge and Coalbrookdale*, 2nd ed., Phillimore, Chichester, pp.70.
- 6 Trinder B. 1988, pp.40-41.

But they were better dressed!

Hamburg, 18-19 October, 2008

Mike Barton

“Fancy a trip to Hamburg?” Such a nice change from organising my own tours through the GDR, and from such a nice chappy, Nick Catford, you can’t really refuse!

Immediately prior to the trip we all received our travel pack via Nick from Mike Grube in Hamburg, which contained a list of the eleven sites we were going to visit in the two days (obviously the economy trip) and accompanied by a detailed street map of each site (the Hamburg guide must have known about Bob’s satnav!).



The group. Photo by Mike Grube

Dramatis Personae

“We”? The normal hardcore for Germany – Dan McKenzie, Robin Ware, Jane McGregor, Steve Underwood, Bob Clary, Tim Robinson, your duty scribe Mike Barton, together with a couple of new “German” faces in the form of Keith Ward and Tony Page. Well, that was the intention anyway. However, when the cabin crew for the UK-based flight started asking about the whereabouts of Nick, the other SubBritters hastened to inform them that he was probably filling his face with a McD special and that they could start without him, which they promptly did.

Their flight landed at the “cheapy” Hamburg airport up in the north near Lübeck, while Mike’s flight up from Nuremberg brought him into the city airport. The main group then had a 70-odd km drive down to our first rendezvous, which they found despite Bob’s satnav. Note: if you ever want in-drive entertainment, you can’t beat bringing Bob along together with his female-voiced satnav.

Right, back to the serious stuff: the first RV. We’d arranged to meet at a bunkered hospital in Eppendorf in the northwest of Hamburg. We came in from our various directions and found our hosts for the weekend, Mike and Christel Grube, Britta Henrici and Ingo Kirsch, all very active members of the Hamburger Unterwelten. Mike Grube had been Nick’s contact for the trip and had oiled the various wheels to obtain access to the numerous

sites. All spoke English, so we were able to do without interpreting taking up half the time. We were later joined by two further SubBritters, John Beckerson and a friend who happened to be in Hamburg for the Saturday of our trip and a couple from Rome, Adriano Morabito and his girlfriend, Elettra, both from Roma Sotterranea.

Second World War Operations

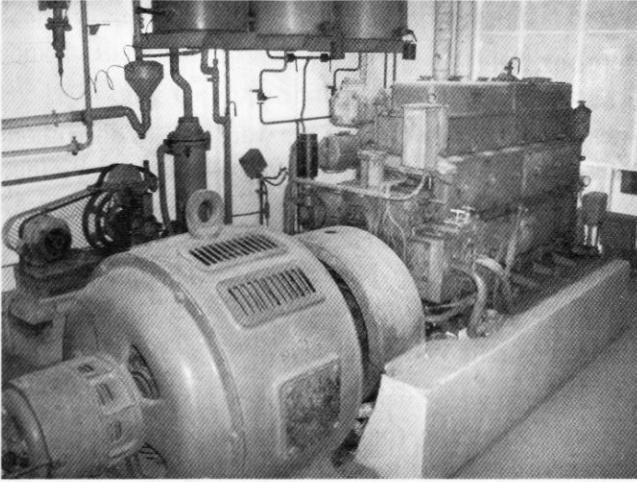
Mike Grube welcomed the group to Hamburg and then led us across the road into the hospital complex. Eppendorf is home to Hamburg’s largest hospital and has two bunkers dating from World War Two. We immediately passed an obvious surface bunker, turned the corner and came across an even larger version. A good start! Mike then handed us over to Ingo, who gave us a good introduction to the larger bunker before guiding us through the complex.



Exterior view of Eppendorf Hospital

The medical equipment has long since been removed, and nowadays most of the rooms are used to archive hospital documentation. Fortunately, the service equipment is still available in the cellar, but even upstairs there were the odd items to see, such as the bed lift with an interesting floor indicator. Entrance was via blast doors with various twists in the corridor to defeat any blast wave. On our trip through the bunker, crates threatened briefly to curtail further progress up the stairs, but they were soon negotiated, and we got to the top.

The purpose of the bunkered hospital was to enable medical operations to be carried out in the event of airraids: patients due for an op at the “wrong time” would be moved across to the bunker from their normal ward and the operation would be carried out in safety and without interruption.



Diesel Generator.

Down in the cellar we were not only able to see the service equipment, but also to pass along a tunnel linking the bunker with the smaller bunker we'd seen as we entered the hospital complex. Pipes had subsequently been laid in the hospital grounds and rather than dig deeper to pass under the tunnel it was decided to lay them across the tunnel. As a result a new floor was built in the tunnel in the form of concrete steps rising to cross the pipe's course and dropping down on the other side. This, of course, reduced the head clearance rather dramatically!

We then decided we'd had enough of bunkers for the day and departed in convoy for St. Pauli, the Soho of Hamburg. But fear not, stout burgers! We were not to be led astray by the pleasures of life! Instead, we made our way to the nearby tunnel under the Elbe.

Unter die Elbe

When completed in 1911, the tunnel under the river Elbe was a technical sensation. The 426m long tunnel provided a link for the thousands of harbour workers to get from the main part of the city across to the shipbuilding area on the low side (right bank) of the river. Previously, they had had to use ferries during shift changes, but any bad weather would put an end to this with the result that there was no shift change and the oncoming shift lost a day's wages and work ceased in the dockyard. At the same time, the off-coming shift couldn't get back home. So the tunnel was built.

The two tunnels are used during the week by vehicles which are transported by lift down to the tunnel level. From there they can proceed along one single-lane tunnel to the lifts on the other side, with traffic travelling in the other direction using the second single-lane tunnel. The tunnels do in fact have pavements on either side, but it must be rather unpleasant to walk through the tunnel during the week. Fortunately, the tunnel is closed to traffic at the weekend, so pedestrians have the tunnel to themselves with the only danger coming from the other users, cyclists.

Originally, the tunnel was planned for horse-drawn carriages, hence the narrow carriageways. Equally, the

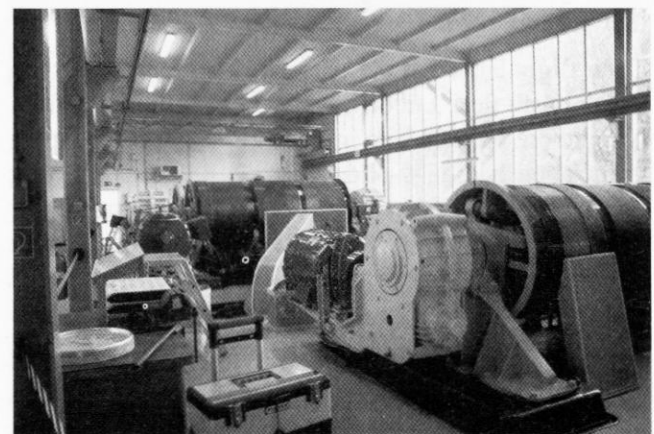
internal height of the tunnel was determined by the driver sitting on the carriage seat with his whip raised in the air.

Historically, the shipbuilding area of the harbour has changed dramatically and shrunk in size. Houses and firms are now to be found on the south side of the Elbe, so that, should emergency services be required over there, it is still quicker for the tunnel control to be warned that blue lights are on the way, lifts are cleared and the emergency services are then lowered to the tunnel level and off they race! The alternative is a far longer route over the Elbe via a bridge some distance away.



Vehicle Entrance.

The tunnel is beautifully tiled, especially in the area of the two lift shafts. "Lift shaft" doesn't really give the proper impression of its magnitude: looking at the lifts with your back to the tunnels you have a passenger lift on each side with four wide vehicle lifts in between them, beautifully panelled in wood. A stairwell zig-zags its way up one side of the shaft wall to bring the young and fit, such as Sub Britters, to the surface. The shaft itself is open so you have a complete view of the steel girders forming the framework for the six lifts – technically very impressive!



Tunnel machine room.

We walked the length of the tunnel, endeavouring to knock cyclists off their bikes (a bit like coconuts at a funfair, except that you get dirty looks instead of a prize), took the lift to the surface on the other side and came across

customs sheds and facilities! Hamburg has a free-trade enclave associated with the harbour and container yards so we found ourselves regularly passing through customs (with nothing to declare, of course!). We were then allowed a behind-the-scenes visit to the machine room for the lifts' hoisting gear. The duty mechanic even lowered one of the vehicle lifts down the shaft for us, which gave us an opportunity to see the centrifugal brake mechanisms in operation.

On our return walk through the tunnel we stopped at one of two brown "arches" in the wall tiling: the tiling is elsewhere of a pale colour, but at two locations, one at each end of a stretch immediately under the Elbe, an arch made up of brown tiles has been inserted on the walls to indicate where solid dams were set up when the river bed was being deepened. It was feared that the dredgers might possibly break through the roof of the tunnel so both tunnels were blocked off for the duration of the work.

Air-Raid Shelters



Entrance doors

Enough of tunnels, where were more bunkers?! Our next port of call was very large air-raid shelters at Steintorwall (Stone Gate Wall) and Hachmannplatz (Hachmann Square) adjacent to the main railway station. These were built during WW2 and were updated in the 1960s to be used as Civil Defence fallout shelters, one for 2702 people, the other for 1447 people. A fascinating concept once you're inside, but psychologically challenging! Rows and rows of tightly packed hard wooden seats with seat belts and moulded "spongey" headrests; based on the idea that the belt would hold you on the seat should you either fall asleep and want to demonstrate the effects of gravity or else in the event of a shock wave hitting the bunker. In addition, you would have taken your place on a seat in the knowledge that this was home for the next 16 hours – in words nine hundred and sixty minutes! – to be relieved by the following eight hours when you could occupy one of the beds in the bunker. Anti-social

behaviour – screaming kids, stressed mums, smelly neighbours – wasn't a major consideration evidently. There were limited facilities for catering, toilets, washing, etc. However, the 1940s version of a fitness centre was included, albeit in the form of an emergency manual ventilation system. All in all, it would have been a once-in-a-lifetime experience. Incidentally, the air-raid shelters are still on the operational list.

Access to the facility in wartime would have been through an entrance made deliberately narrow by a flexible section on each side to prevent a crowd of people trying to enter all at once and to ensure that only one person at a time passed over the mat on the floor since there was a counting device fitted under the mat which was used to check when the bunker was full. Just before we left the railway bunkers, Mike and Ingo demonstrated the hydraulic doors which they have got back into working order. Ingo stood at the control panel, hidden behind a wall and observed the entrance area through a small reinforced glass window. A simple hand movement and the two inner entrance doors hissed closed. Very impressive!

German for beginners: MZA = Mehrzweckanlage = multi-purpose facility, i.e. an underground car park, doubling up as an air-raid shelter. This was very similar to the MZAs we saw in Munich, as reported elsewhere in the magazine. The parking bays would serve as the bed space for bunk beds suspended from metal frames attached to the ceiling and floor, with the connection points already being marked out. Behind the walls of the car park are the service facilities – catering, sanitation, kitchen, stores, etc. – with access via doors set in the car park walls.

Part of the facility is a WW2 tubular bunker, converted for 'modern' use. The rooms were basically still in very good condition and were primarily packed with essential stores for use in an emergency – blankets, toilet paper, and the like. We were also allowed here to crawl through dirty openings in the wall (what life is all about!) to crawl into a further tubular WW2 bunker which Ingo had discovered by chance while exploring the main air-raid shelter. This one was in more or less original shape but also rather wet.

By this time (19.30), some of the younger sprogs in the group were starting to wilt, using the excuse of having been up since 02.00 that morning. Hallooo! Whose fault is that, may I ask? We therefore made our way round a couple of corners, once back up at street level, and walked to Trude. "Trude" is not only a female German first name, but also an acronym from "Tief runter unter die Elbe" – "Down we go deep below the Elbe". This was the name given to the tunnel boring machine which was used to excavate the fourth autobahn tunnel beneath the Elbe a few years ago. The actual cutting wheel still stands in front of the restaurant, a former factory building which

has been very satisfactorily converted and which offers very good food at reasonable prices. Our German hosts were treated to their meal as a hearty thank-you for a very successful first day. It was also an opportunity to discuss a 2009 tour with Britta and Ingo.

After the meal, a sightseeing tour through Hamburg's suburbs brought us out to our hotel, a Telekom conference centre, for a very good night's sleep. This was followed by an excellent buffet breakfast in preparation for Day 2 of our expedition through further city sites.

Flak Towers



External view of Heiligengeistfeld.

Even without the assistance of satnav devices you can't really miss the flak towers in the city – they are big, stand-alone concrete edifices. “Flak” comes from the German “Flugzeugabwehrkanone”, i.e. anti-aircraft. The site at Heiligengeistfeld (Holy Spirit field) was particularly interesting since it is a Mark I tower, an exact copy of the Humboldthain flak tower in Berlin, which is familiar to a large number of SubBritters. In contrast, though, the “Hamburger” is still in one piece and is not surrounded by trees, so we were able to get an excellent view of the monster as we walked towards it. Secondly, we were able to see the internal staircase around the centre well of the building as it must have looked in the Berlin bunker – very impressive indeed.



Heiligengeistfeld stairs. Photo by Mike Grube.

What was also impressive was our visit to the roof, thanks to the assistance of the caretaker who'd driven in 30 miles on a Sunday morning to do us the honours. We

ascended by lift and a couple of staircases and then found ourselves on the roof. The four “blisters”, one at each corner, are likewise still in place, so you get an excellent picture of where the original twin-barrelled 12.8 cm AA guns stood, together with their protective machine guns on mini-platforms around them. Mike Grube told us that on average some 30,000 shells were fired to achieve a single aircraft hit. The problem here was also that the barrels had to be replaced very frequently as they overheated. In addition, the munitions had to be manhandled over great distances as there was no automatic delivery service to the gun positions.

As in Berlin, the control and radar tower for the flak tower was located a short distance away. Although the actual control tower was demolished in 1973-1974 and replaced by a hideous building, we could view the site from the flak tower roof. And one more fact: some 30,000 people would have been found in the tower as it served not only military purposes with the gun crews and support personnel, but also acted as a huge air-raid shelter. Interestingly, the tower has rows of windows in each wall, with one of them still showing the original metal shutter hinges. However, the windows not only had the shutters closed during hostilities, but the windows were also bricked up and only reopened after the war.

For a change, we then drove off to a second flak tower, this time the Wilhelmsburg tower, the second of the two towers in the city. This is a Mark II flak tower with the design of the roof and its overhang differing from its neighbour.

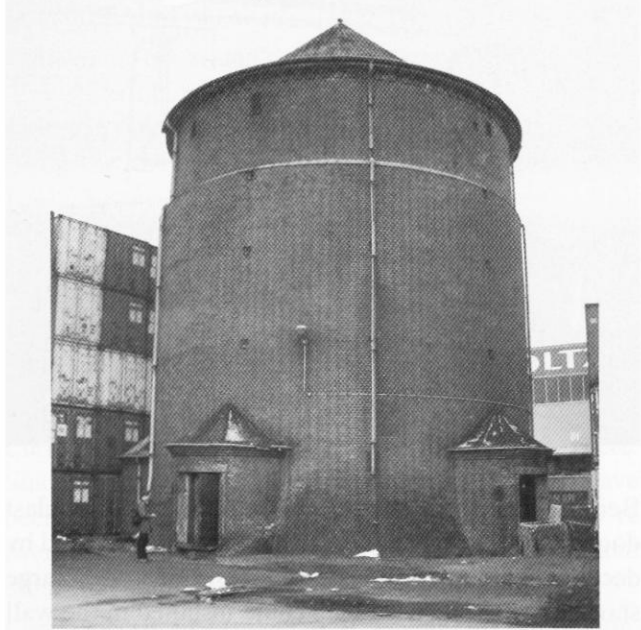


Wilhelmsburg Mark II Flak Tower.

The windows are also omitted in this design, which would partly explain what happened when attempts were made to destroy it in 1947. As elsewhere, the British military, then temporarily resident in Hamburg, stacked lots of surplus-to-requirements shells, ammunition and explosive charges and detonated the lot in an attempt to bring the tower down. Instead, it went up! The top half separated from its bottom half, emitted a belch of smoke and fumes through the cracks and then settled again on its lower part. Impressive? – Yes! Effective? – No!

The result is a load of rubble inside and a practically intact exterior. Unfortunately, the bunker is not open as the German equivalent of the HSE also draws the line somewhere. However, the tower is used as a transmitting point by a communications company which has erected a securely protected ladder up the outside of one of the walls – happy scaling!

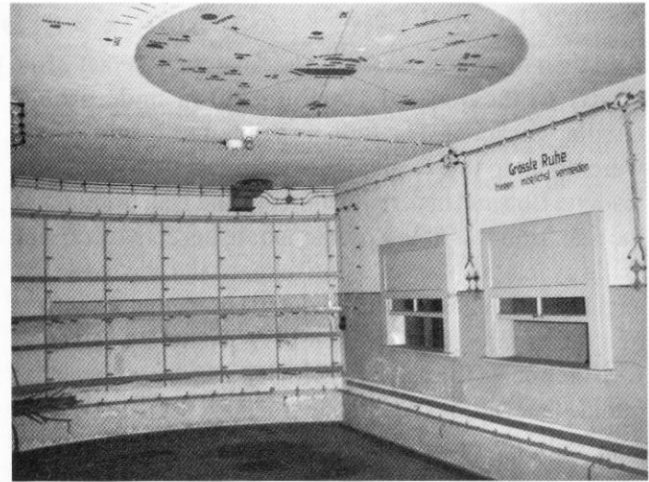
They might have had better-looking uniforms, but they couldn't stop us getting to our next destination, despite the road blocks they threw up everywhere – you simply cannot stop a SubBritter when he's got the bit between his teeth. After a couple of deviations we drove in through a container port with towers of containers either side and arrived at a stubby red brick circular tower.



Howaldtswerke tower.

This had served as an air-raid shelter for the workers at the Howaldtswerke (Howaldt Wharf), where the famous submarine Type XXI was built. Due to its location in the middle of the factory complex it has never been vandalised. A very interesting feature is its five doors, each one of which leads up via a circular stairway along the inside wall just to one of the floors. We ascended the stairway leading to the fifth floor and from there via an open wooden stairway up to the roof section where the ventilation system was located. On each floor toilets, washing facilities, storerooms are located around the outer perimeter with the centre being reserved for some 100 people on each floor. An opening on the top floor in the middle of the ceiling served originally as the opening for a periscope so that the surrounding area could be observed without leaving the building. Damned clever, these submariners.

Having descended via an internal stairway from the fourth floor to the ground floor we entered the dock's wartime communication centre through its emergency escape, an 18 inch square hole in the staircase wall. The centre



Plotting room.

room was magnificent! On the ceiling a map was painted with key locations in and around Hamburg. This was the air-raid reporting and plotting centre: the rooms either side served communication and reporting purposes with the main plot taking place in the centre room. A sign on the wall not only called for silence, but also requested that people should refrain from asking questions!



WWII view of Fink II Submarine pens.

We'd already passed over a U-boat pen (Elbe II) on our way to this tower, but this had been demolished completely in recent years, so there was nothing to see. To cheer up the more tearful members of the group we therefore proceeded to Fink II, another submarine pen. This was also demolished postwar so that the Airbus A380, under construction nearby, could have a sufficiently long runway, when it came to the crunch (or not). However, the individual entrances to the pens and the collapsed roof sections were still visible.



Fink II Submarine pens today.

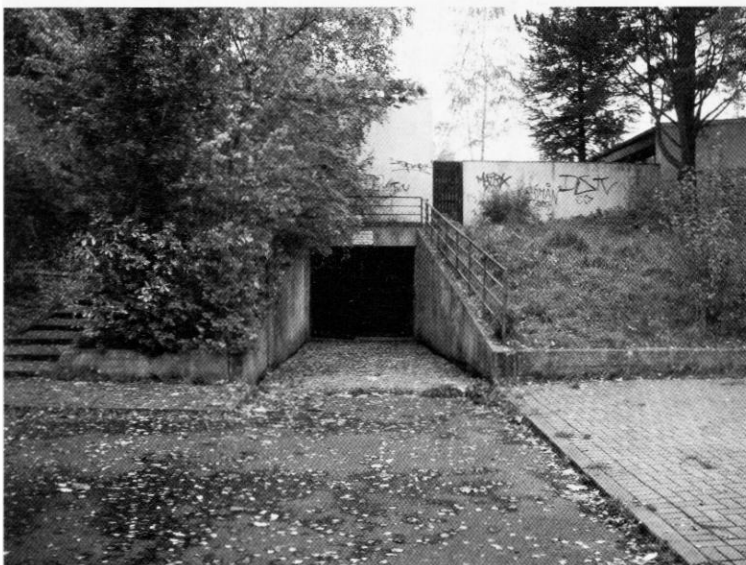
Another Hospital Case

And then there was one. For the final visit we set off to Wedel to the west of Hamburg to an underground auxiliary hospital. The Italians had left us by now so we were down to three cars, with Mike and Christel Grube leading, Bob and his crew following and Dan bringing up the rear. Bob was able to demonstrate his convoy driving skills by leaving the autobahn to reach the slip road at an angle of 110 degrees (think about it!) immediately in front of a rather large truck, which very kindly serenaded us with his hooter, thus skilfully leaving Dan travelling in the middle lane, hiding behind the truck.

Dan, who had braved the journey without the use of a satnav, decided to leave the autobahn at the next exit, swing over and rejoin the autobahn from the other side. However, the fiendish Hun had blocked this autobahn access, thus obliging Dan and his crew to rapidly master the intricacies of working out the route with the aid of maps on paper (in this day and age!). Needless to say, they arrived at the hospital site within hours of us, whereupon Dan briefly, but succinctly, instructed Bob in convoy driving skills (CDS advanced).

Note: For those of you wishing to improve your own CDS, I can do no better than recommend the advice to be found in the article "Never Again!" published in Subterranea Issue 9 (December 2005), p. 47.

The hospital was a very impressive end to an impressive weekend. In the 1960s, the West German government had started a programme of building a number of "auxiliary hospitals" with the aim of being able to handle large numbers of civilians in the event of an epidemic, catastrophe or war. Some of these were underground and bunkered, viz. Wedel. This was also the largest of such hospitals built and was designed to accommodate some 1600 patients plus the attendant staff. The hospital is now located under a school (as were most of the auxiliary hospitals) and was built in three stages between



Entrance

the early sixties and mid-seventies with a connection being built between the two buildings so that the hospital could also have used some of the school facilities.

The hospital was never manned, but was nevertheless fully kitted out. Personnel were assigned from regional hospitals in the area. It did actually experience an exercise in 1975 and the empty rooms are now partly used by special police teams from time to time. If necessary, major operations could have been performed in the surgical department, following triage, which would have been carried out in the school's gymnasium. The playing fields were to double up as the helicopter landing site.



Ward

Being a bunkered hospital you had the standard blast doors to pass through at the two entrances, followed by decontamination facilities in the form of a very large shower room, preceded by a chute installed in the wall to dispose of contaminated clothing.

Although most of the "hospital" rooms are now empty – the medical equipment was donated to poor countries in the 1990s – the service facilities are still in situ and are in good condition. This is more than can be said for the building fabric itself, which is suffering from the high level

of humidity in the complex, i.e. bits of concrete are gradually peeling away from the ceiling!

Our weekend in Hamburg had finally come to an end. We had all had an absolutely fantastic time thanks to our German hosts, but in particular to Mike Grube who had arranged everything beforehand and had accompanied us over both days. Thanks also to Mike, Ingo and various members of the group for reading this text and correcting my ageing memory on several points.

Thanks are also due to Nick, who had done the initial link-up to get the ball rolling, but then had to dip out at the last minute, and to our two drivers, Bob and Dan. And finally to Dan, Christel and the scribe for the various photos used in this article.

(Photos by Mike Barton unless stated.)

Five Go Underground in Cappadocia !

David Ferris and Linda Bartlett

Background to Cappadocia

Five members of SubBrit visited Cappadocia in April 2008. It was a lot of fun and is recommended for another, larger, group visit.

Cappadocia is in Anatolia in central Turkey, around 200 miles from east to west and 100 miles from north to south. It has very unusual and beautiful scenery, which consists of soft rocks that have been eroded into valleys, cliffs, and canyons. For at least two thousand years, people have carved homes, working spaces, and churches into the rocks - you find them everywhere you go, often in great profusion.

Some of the excavated cave systems are very extensive. As well as numerous individual houses and churches, over 150 'underground cities' have been discovered during the last 100 years, and more are being uncovered. These allowed townspeople to shelter during times of attack. Larger cities contain many hundreds of rooms, have 7 or 8 distinct levels, and are over 60 metres in depth. Cappadocia appears to have by far the largest collection of man-made underground spaces anywhere in the world.

Turkey today is 98.8% Muslim; but it was a cradle of Christianity, and until recently, many Christians lived here. Since about 300 AD, many hundreds of churches have been cut into the rocks. Like other types of caves, they're everywhere. Many contain decaying wall paintings, and most are completely open to the visitor.

Cappadocia is, like Turkey itself, a middle-income region. It has delivered substantial improvements in prosperity over the last 50 years. Current GNP per capita is around \$9,000 per annum. This makes it very picturesque and comfortable for the British visitor. Peasant women wrapped in large pyjamas and shawls huddle with their children in doorways, and wave at you. Swarthy mustachioed men in cloth caps idle out the days in cafes. Muezzins call the faithful from slender minarets. Carpet sellers offer deals and eternal friendship. Portraits of Mustafa Kemal, the revered founder of modern Turkey, drape official buildings. Hotels and food are inexpensive.

Thus Cappadocia combines world-class underground exploration with world-class history, world-class scenery, and a westernised-and-oriental culture that's different and interesting - no wonder that it has been awarded World Heritage status, one of the few worldwide sites that combines both man-made and natural features in its listing.

Geology

The base layer of the area consists of sedimentary rocks laid down in lakes and streams. On top of these, volcanic eruptions over the last ten million years have laid down two types of layer:

- Loose material, mostly stones and dust. The material has gradually become compacted. This is known as tufa, or tuff, and is found in layers up to 100 metres deep.

- Lava flows. These are largely basaltic, and form a capping across much of the region, lying on top of the tufa.

Temperature variations (ranging from much snow in winter to hot summers), together with wind and water, erode the rocks, fragmenting and breaking through the basalt layer, so that the softer tufa is shaped into dendritic structures consisting of sheer cliffs, canyons, and valleys filled with eroded material.

Thus the overall effect is rather like that of the Colorado Plateau in the American southwest. However, the scale isn't so large, and the rocks aren't as red. The scenery feels human-sized and intimate.

Specifically, the erosion creates conical structures between 20 and 100 feet high, often called 'fairy chimneys'. These have been created due to a capping of harder rock, which has protected the soft rock underneath from erosion; as the cap has fractured, the chimneys are a result of water percolating through and starting the erosion process, which has been enhanced by further water and wind erosion, sculpting the soft rock into peaks. Sometimes the piece of harder rock remains on top, giving a very picturesque, mushroom-top effect much trumpeted by the tourism industry. Living accommodation and churches are frequently carved into the larger 'chimneys'.

When erosion has taken place on a larger scale, deep canyons are formed, anything from one to 300 metres wide. These wind their way between fairy chimneys and steep sided cliffs, many with their little caves excavated within them. All this makes for extremely unusual, beautiful, and striking landscapes.

Man-made Caves. The rocks are very easy to cut into. Three people can probably excavate a living or sleeping room in a few days.

Canyons eroded by the action of water and wind often contain arable land, so it is natural for farmers to simply burrow into the sides of canyons to create sleeping, working, or storage space. Towns are often in valleys, beside cliffs or on a hillside, so here also it is natural to dig into the rocks to create dwellings, or extend conventionally constructed buildings.

When you've burrowed a room, it's usually not long until you need extra space. So usually cells cut in rock end up connecting to five or six other cells, either keeping parallel to the exposed rock face, or cutting further into the rock. Often, excavations extend to several storeys.

It's not known how long people have been cutting into the rock, but it's at least since Hittite times - 2,500 years

ago. Since the land is fertile, many people have lived here over the centuries. As a result, everywhere you go seems to have a profusion of caves. Nowhere else has anything like so many man-made spaces. There must, literally, be hundreds of thousands of them; perhaps there are millions of them.

Excavation of rooms is still commonly done today. For example, people cut extra rooms for their houses and farmers cut storage depots. Recently, caves have been excavated for the storage of potatoes (the main crop in this region); these are big enough for a lorry to drive into, whereas most of the other caves are 'people-sized'.

The main types of cave are:

- Living spaces for people
- Storage spaces, eg for food and implements
- Churches. These date from about 300 AD onwards
- Monasteries
- Underground cities, built as refuges.

Churches

Cappadocia is one of the cradles of Christianity, practised since about 300AD. Churches have often been cut in the rock. There are very many of them, probably about 3,000 in all. Many are very old, dating from the first millennium. They were decorated with Byzantine religious paintings in bright colours, and remnants of these paintings are still very much in evidence.

A church tended to evolve over time. Sometimes a small church was cut, suitable for perhaps twenty congregants. Later, it was extended, to provide for perhaps several hundred. Later, tombs might be cut into the walls or floors. People were buried for several years, until the flesh had decomposed and disappeared. Then the bones were stored elsewhere, freeing the grave for a new occupant.

Underground Cities

Some towns built very extensive cave systems, dubbed 'underground cities'. These provided refuge in times of war or during the transit of armies, and are along the lines of the *muches* of northern France (see page 44) although the latter are much smaller. They provide living space, food storage, living space for livestock, defences, water supplies, kitchens, wineries, churches, air circulation systems and so on.

Over the last 100 years, almost 160 different underground cities have been found. New ones are still being discovered. The largest are much larger and more complex than the *muches*. For example, Derinkuyu has eight floors, and is about 80 metres deep, and could accommodate thousands of people for extended periods.

The most common type of defence is a large millstone, that can be quickly rolled to block a passageway. Defenders, unlike attackers on the outside, can easily roll the stone back out of the way. Various mechanisms around the millstone make life nasty for attackers. For instance, the approach tunnel is made low, and arrows

can be shot through a hole in the centre of the millstone at intruders; spears can be poked through the side walls. Everything has to have a point, especially if you're an unwelcome guest in an underground city.

Effect of Erosion

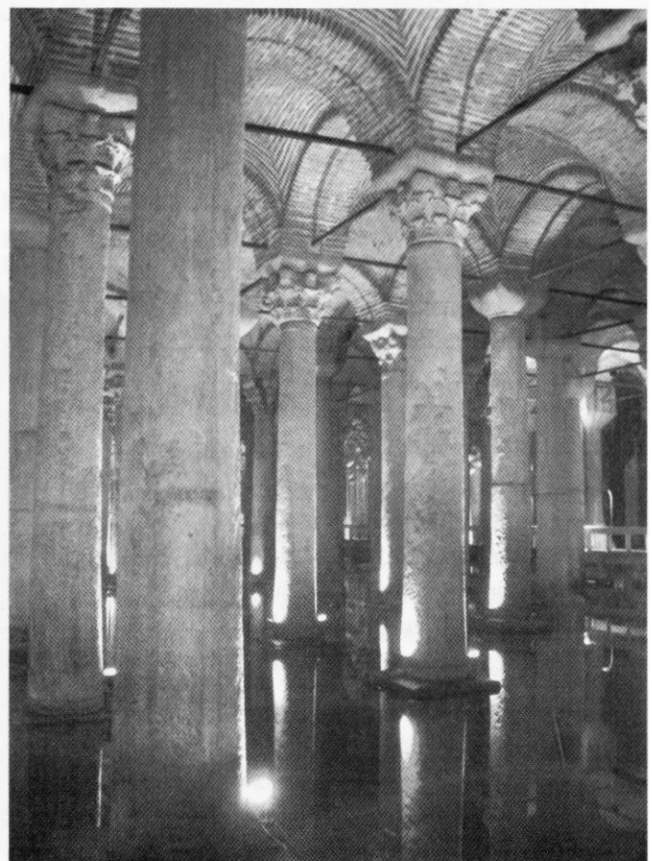
The rocks are friable, but once exposed to the air, the surface hardens. Nevertheless, erosion takes its toll. One source (not necessarily reliable) estimated that cliff or canyon walls can erode at 2 cms/year. In any event, it does seem likely that over 1,000 years, several metres of rock can be eroded from a rock face.

This means that many rooms cut into cliffs or canyon walls have now become exposed, with their outward-facing wall having fallen away. New walls have been built into caves where the existing rock cover has gone. Pathways have disappeared.

The trip itself

The main trip to Cappadocia was undertaken by five members of SubBrit, but we all arrived in Turkey at different times. Martin Dixon and Linda Bartlett flew into Istanbul a couple of days early, and Linda takes up the story at this point. We spent time exploring the Topkapi Palace and the Grand Bazaar – all fascinating sights, but nothing underground open for access.

Gerald and Danuta Tagg arrived the next day in Istanbul, and together Martin, Linda, Gerald and Danuta explored the Blue Mosque and Ayia Sophia – again very memorable old buildings, but with no underground interest. After an excellent lunch of *Mezze*, the four explorers set off to



Basilica Cistern in Istanbul.

find some underground space – managing to gain access to two underground cisterns. These were built for water storage and are vast structures – to date over 30 of these are known throughout Istanbul. They were built in the fourth and fifth centuries AD to serve the Roman capital of Constantinople (as Istanbul used to be known).

The Basilica Cistern is the larger of the two, and its statistics are staggering, as is the sense of awe as you wander round this cavernous space. It has 336 pillars supporting the roof and would have held 80,000 cubic metres of water (the cistern is now empty and disused apart from a few inches of water on the floor for ‘effect’, over which a walkway has been constructed to aid the visit). It measures 138 by 64 metres. It would have been fed by aqueducts, bringing water from the Belgrade Forest area. The pillars and capitals are variously carved, giving rise to the theory that the pillars would have been reused from earlier Roman (or possibly even Greek) buildings.

The second cistern was the Cistern of 1000 pillars, although there are actually only 224 pillars, but it is still massive, measuring 64 by 56 metres. This cistern is now dry and used as a performance space; as such it had a bar and a café, where we took refreshment. The loos were particularly fine – each cubicle with its own pillar-work and cave wall!

We then travelled to Istanbul airport where we met up with David Ferris – the Famous Five were ready for their adventure!

Day One. April 22, 2008

So, the five members of Sub Brit flew into Kayseri, the main town in Anatolia. David Ferris now takes up the story again.

It was late in the evening, and in the dark we drove for an hour to Uchisar, a town of 2,000 people in the centre of Cappadocia. The town is dominated by a ‘castle’, a stub of rock about 100 metres in diameter and 60 metres high. It’s peppered with caves and looks very picturesque. There’s another, smaller, stub of rock in the town. Both stubs are heavily eroded, and the smaller one has been excavated to such an extent that not much seems to be left.

Many of the buildings in Uchisar have rooms that are carved into the rock. Gerald, Danuta and David stayed with a friend of David’s, Susan Walsh. She has a nine-roomed house, of which four are cut in the rock. Gerald and Danuta had a cosy bedroom cut deep into the rock, which Susan appropriately calls a “Room within a Womb”. David’s room was conventionally built on top of the other rooms, in stone, but it had the advantage of having lovely views over the village and the valley.

Martin and Linda stayed in a local pension, ‘Les Terraces d’Uchisar’, with fourteen attractive rooms of which seven are cut in the rock. Martin and Linda, naturally, stayed in one of the rock-cut rooms. Not quite as good



Eroded underground dwellings and minaret in Uchisar.

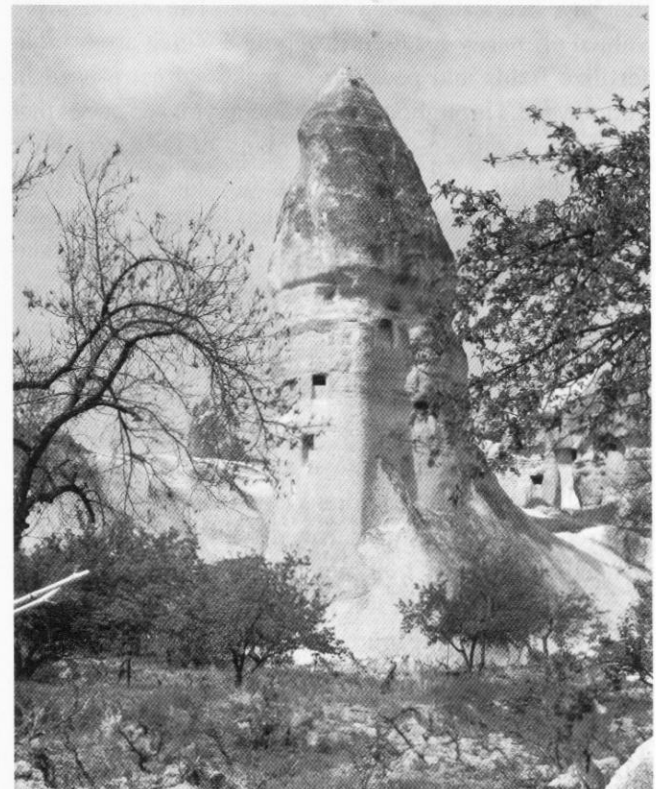
as it sounds: the rooms were cold and damp, as they had been closed up for the winter.

Martin, Linda, and David were all fortunate to be awakened at 4.30am every day by the local calls to prayers. Loudspeakers helpfully amplify the muezzin’s wail, and his assertions of God’s Greatness, Generosity and Goodness.

Day Two. Wednesday April 23

Churches and Living Space in Goreme. Our guide for the day is Bernd Junghans, a German who has lived locally for some years. He is passionate about the history of the region, and his website links to his friend’s excellent pictures of churches - see www.berndputz.de.

We start our visit in Goreme; first, a single room cut into a cliff face – Bernd postulates that this was the first



'Fairy Chimney' in Goreme Valley.

dwelling here, constructed for a hermit. Right next to it is an early rock church. This dates from about 300AD. It's a small place, perhaps used for about 30 congregants. It appears to have become too small, and a larger church was excavated next to it, for perhaps 100 congregants. This we later learned is a common practice: build a space, then later on you need more space, so excavate a larger space adjacent.

The larger church is quite elaborate. There are plenty of columns cut in stone, imitating wooden construction. Arches over the columns are constructed in Arabic style. The church was used as a meeting place, not just for sacred activities. At the centre is an 'ambo', a raised podium where an individual could speak to everyone; this seems to be unique in Cappadocia.

The older church, now redundant, had slots for temporary graves added. The practice over many centuries was to bury people for several years, until the flesh had been removed and only the bones remain. Then take the bones away to some sort of bone store, freeing up the grave for a new burial. Again, this practice is repeated widely throughout Cappadocia.

The remains of early frescoes were to be seen. Throughout Cappadocia, you see such remains, often dating back to 300 to 600 AD.

A few yards away from the two churches are a set of connected living rooms cut in the rock. The standard floor plan was about 6 metres square, with two raised rectangular platforms, about twin-bed size, that were presumably used as bed platforms.

Many of the living room caves are filled with small niches that have been later added for pigeons. The pigeons were valued primarily for their droppings, which are used to fertilize fields and possibly to make saltpetre used in gunpowder. Throughout Cappadocia, you see caves that are cut as a pigeon-cotes; and many of the caves built for human use have had these pigeon-holes added, often as a fairy chimney has been eroded to make the rooms uninhabitable for humans, and the fronts are then bricked up, with little entry holes for the pigeons.

Mazi Underground City. Next we went to Mazi, an out-of-the-way small town, to visit its underground city. This was discovered a few years ago, and the villagers are gradually excavating it. It's a large maze of connecting rooms, on many levels. We saw only a very small proportion of it. Underground cities in Cappadocia are referred to by Xenophon, around 400BC, as being able to accommodate 10,000 men. They've gradually been excavated over the years: if people need more space, they simply dig some more caves. There is evidence that some of the rooms near the surface have been reused as cellars for later houses constructed above ground.

Mazi underground 'city' is much larger and more complex than the *muches* of northern France. We frequently see large millstones which can block passages,



The Sub Brit team with Susan and Bernd ready to go into Mazi Underground City.

and which could quickly be closed. Once closed, they are very hard to move from the outside, hence providing a substantial defence against intruders and attackers. The doors thus blocked are designed so that the people inside can remove the millstones with comparative ease.

There are also a number of crude traps for attackers, such as slots in the sides of tunnels through which spears can be poked. There are also 'speaking tubes' – small tunnels, some 15cm in diameter and up to 20 metres in length, allowing people on different levels of the cave system to talk to each other.

In this city, there are many vertical shafts. They're commonly between 2 and 10 to 15 metres in depth. Most allow human beings to move about, and all have steps cut in them. With practice, nimble people can quickly move up or down the shafts. Some of the shafts allow access to wells, and such shafts can be 30 metres or so in depth. We climbed up and down a number of them; at times this was quite scary. Health and safety measures are crude in Turkey; it's a good thing there are relatively few visitors, because there's a real danger of nasty accidents. We were strapped to a rough-and-ready harness, but it's not clear that this would have stopped us falling had we slipped!

Sobesos. We visit Roman excavations at Sobesos. Nothing underground here, but a lovely spot for a picnic, and some fine mosaics.

Keslik Monastery. This was founded in around 400/500 AD, and finally abandoned in 1912, and had some 50 or 60 monks. Many of the monks' cells are in individual fairy chimneys. One two-room apartment looked particularly attractive: nice lounge, and a nice adjacent room that would make a cosy bedroom. The refectory was cut in the rock, with its tables and benches also in rock.

Day Three. Thursday April 24

Volcanos. We drive to Lake Nargolu, about a kilometre wide, in the caldera of an extinct volcano. The wind's



'Millstone' used as defensive door, in Keslik Monastery.

blowing very hard, and there are dust storms around. Gerald's hat, held on its strap, is pulled out horizontally from his hand. Susan assures us that there's still volcanic activity in the lake and that you can get sucked down to oblivion in hot muddy whirlpools. Above the lake are volcanic lava flows that have cooled into large columns, reminiscent of the Giant's Causeway and Fingal's Cave. All this is evidence of the huge amount of volcanic activity taking place years ago. In the distance, as we travel, we can see the characteristic snow-capped shape of the most recent volcano, responsible for the tufa and lava layers we see today spread across the region.

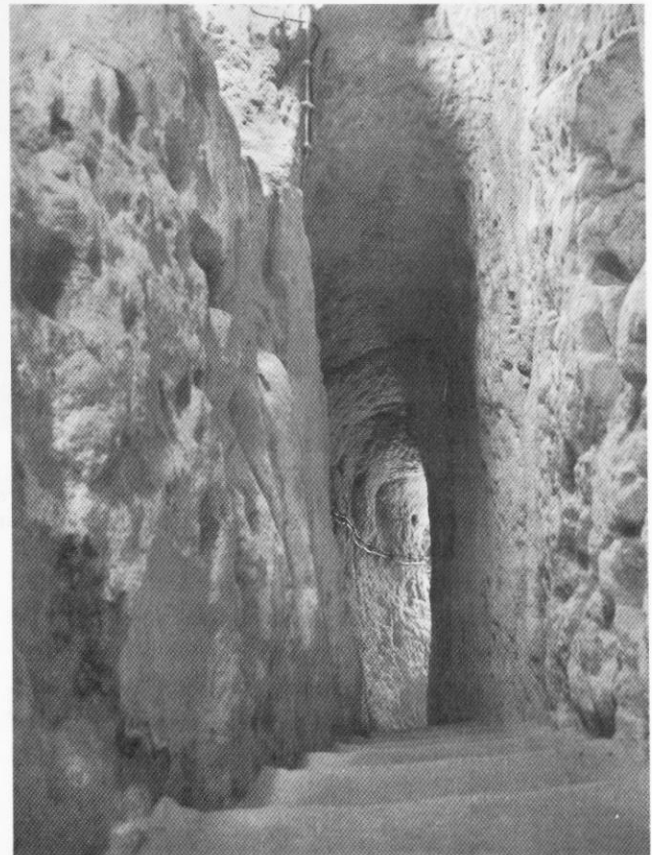
Ihlara Valley. This is a picturesque canyon with lots of churches and dwellings cut in the rock. The stream in the middle of the canyon is clearly responsible for cutting the canyon and carting off the detritus. The whole canyon is perhaps 15 km long; we walk along half of it, to the Aslan Restaurant for a pleasant lunch. From here, the lava flow capping the tufa can be clearly seen.

Derinkuyu Underground City. A few of the underground cities have been turned into tourist attractions. The others are entirely undeveloped, and can be explored if you know where they are. This city has also been awarded World Heritage status, along with the chimneys and monuments in the Goreme Valley.

Derinkuyu is the main underground city open to tourists, and it's huge. There are four or five concentric levels of defense, defined by millstone closures. There are eight floors, going down 80 metres, with many hundreds of rooms. A church is at the lowest, innermost level. There are deep shafts and wells, kitchens, food stores, winery; and, weirdly, a missionary school (the latter from more recent reuse). This is a splendid visit. The human inventory during our visit comprises several groups of well-disciplined Japanese tourists, and several groups of impish Turkish schoolboys marshalled around by teachers.

Less than a third of the site is open to the public. Plenty of unlit side passages entice Sub Brit explorers to investigate further rooms and shafts. We managed to do

a fair bit of this, negotiating passages deepened with steps. The site has minimal interpretation signs, but it's fun to try and work out the usage of all the rooms and passages. It would take a couple of hours to explore in depth (!) – looking out for the holes in the floors with drops intended as traps.



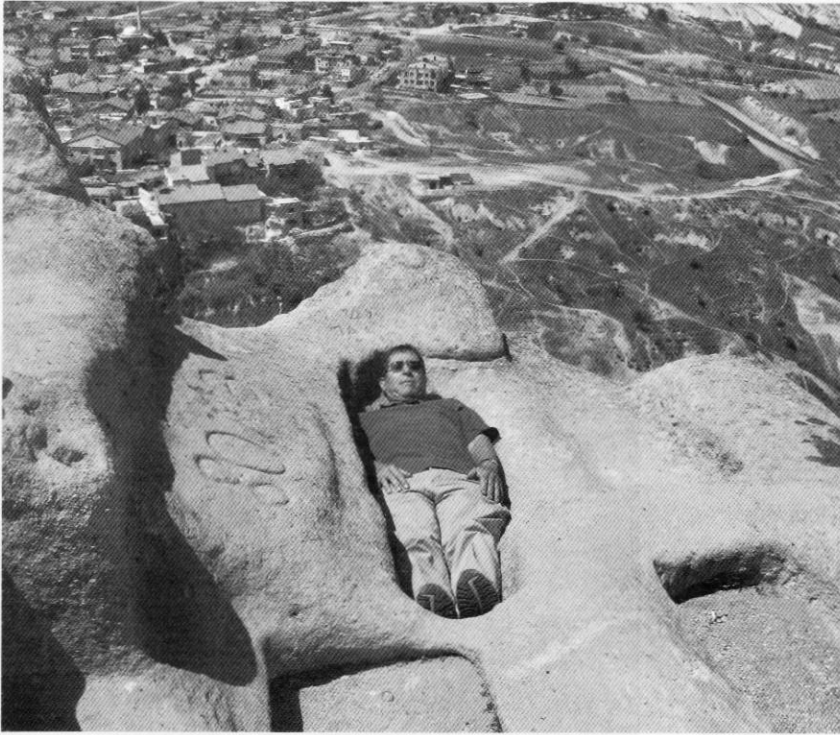
Steeply descending passage in Derinkuyu Underground City.

Day Four. Friday April 25

Uchisar 'Castle'. In the morning, we visit Uchisar Castle. This is a roughly cylindrical block of harder volcanic rock that has been left while softer rocks surrounding it have eroded away. It would have been protected from erosion by its basalt cap, now long gone, so that the top storeys of the church (originally carved within the rock) have eroded away and been further exposed to the elements. The 'Castle' is roughly 50 metres in diameter, and its height rises a similar distance over the plinth. The rock is honeycombed with cells and dovecotes; at the top, there are a series of grave troughs excavated in Roman times.

From the top, there are fine views over the surrounding valleys. You see very clearly how gulleys have cut into the rocks, forming valleys. You look down to Goreme about five kms away, nestling in the heart of the valley. There's a delightful cool wind; but lots of dust. Muezzins cry from loudspeakers on minarets.

Pigeon Valley. We walk down this short canyon into Goreme for about three kms. Lots of cells carved into the walls. Lots of lovely eroded fairy chimneys.



Gerald demonstrating a rock-cut grave, in the eroded Uchisar church (once underground). Photo by Danuta Tagg.

Pleasant lunch in Goreme, then we take a taxi over to Ortahisar where we meet Laura, a friend of Susan.

Laura's House and Canyon. Like many houses here (including Susan's), Laura's house is a mixture of conventionally constructed rooms built with rock, and excavated rooms. The house backs on to a canyon honeycombed with cells. Until recently (as indicated by the modern metal house numbers in front of most dwellings) many people lived and worked in them. Now most are abandoned. Perhaps it was a Greek village that upped sticks in the 1923 Greek/Turkish population exchange; perhaps people simply moved into more modern houses.

We walk up the canyon, beside a small stream, passing small fields from time to time. There are lots of caves in the canyon walls, many now converted to pigeon coops. We walk to an unrecorded church high up on the side. It spreads over three or four levels, with a sort of spire burrowed into a fairy chimney. In a passage below the church there is a large millstone to keep attackers out. There are remnants of wall paintings. The walls are heavily eroded and some have disappeared.

Dinner. Susan hosts a chicken barbeque for us, bringing the group trip to a conclusion. All participants being of a spiritual orientation, we consume many gins and tonics, many bottles of delicious local dry red wine (Kocabag).

We discussed matters of concern to troglodytes, things that keep them awake at night. Perhaps we were trying to focus on scientific matters, emulating our French colleagues in their equivalent underground society, SFES. Six issues were identified:

- Water ingress. The two main causes appear to be (i) stone that is perennially damp, and (ii) ingress due to the weather. Damp caves are considerably less comfortable than dry ones (just ask Linda and Martin!).

- Dust. As most caves are unlined in Cappadocia, there is a fine film of dust across all surfaces – it does not pay to be too house-proud!

- Neighbours burrowing into your caves. Caves are planned informally. You decide you want to excavate a space, you think a bit about how to do it, and then you dig it out. Given the Swiss-cheese nature of the rocks, this means that people regularly break into other people's caves. The issue is complicated by Turkish land rights. In the UK, when you buy land you also, in theory, own all the ground below, right down to the centre of the Earth. However, in Turkey, if you own a cave,

you own only that space, plus a small lamina of space surrounding it: perhaps an extra 10 centimetres. So people can burrow all around you.

- Unpredictable strata. When excavating caves, it's hard to predict the nature of the strata. Surveyors are unavailable, and ground surveys non-existent. So a dig is, to some extent, a voyage into the unknown.

- Interfering authorities. Some regulations, especially in conservation areas such as Cappadocia, impinge on what you can and can't do. A common practice is to do more burrowing than you should. A wall is then built to disguise the extra space, and this is made to look like an ordinary cave wall. After the inspectors have been and gone, it's a simple matter to knock down the phoney wall.

- Heating costs. The winters are cold, and caves close to the outside need heating. That gets expensive. One home owner, admittedly wealthier than average, described how he would spend £150/month on heating. That's significant, when the average annual wage is under £5,000.

The party continues and the booze is accompanied by much backchat and baklava, and many toasts and expressions of appreciation to Susan for her charming and generous hospitality. It's generally hard to remember much after 10pm, although there is evidence that Martin and Linda left around 1am, and Susan mislaid her car at 2am.

It was a hard trip, but someone had to do it.

(All photos by Linda Bartlett, unless stated.)

Taking the Seaside Air

Nick Catford

On Saturday 16 August members of Subterranea Britannica headed down to Brighton for a gentle stroll round the town sewers. During the summer months Southern Water, who own the network of Victorian sewers running under the town, take visitors a short distance into the Brighton underworld. The entrance to the sewers is through pier arch 260 beneath the Palace Pier. As soon as the door opened the smell of raw sewage hit us and stayed with us throughout the trip. "Your nose will soon get anaesthetised to it" our guide told us; my nose certainly didn't.

Having donned hard hats, a tally, and gloves to protect our hands from rats which have been known to scurry along the hand rails, we were also warned about open cuts coming into contact with rats' urine which can lead to Weil's disease. We didn't see any rats although I noticed a couple of trays of rat poison lying on the ground. We moved forward into a small room where we saw a video about the sewers and the recently constructed storm water storage tank running 100 feet deep along the beach.

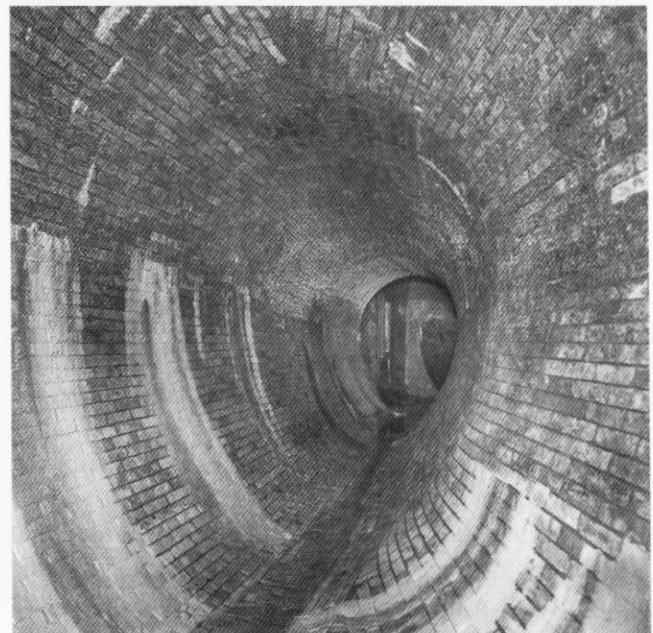
Having seen the video we split into two parties as the first section involves some narrow passages and small rooms. "It's at this point we find out if anyone is claustrophobic" explained our guide; though being seasoned underground explorers none of us were. We entered a winding 'safety passage' that links a number of sewers at a lower level. At the end of this passage, below the front of Harry Ramsden's chip shop on Marine Parade, we were able to look down into the fast flowing east - west intercepting sewer running between Hove and Portobello. The murky water is about two feet deep and our guide explained that because of the fast flow all the solid material, much of it fat from local restaurants, is broken up. This and other intercepting sewers carry storm water, domestic and industrial waste water and foul water all mixed in together. There is a large trap door in the floor at this point which gives access to the 'catch tanks'. These tanks or pits were built to collect road grit and heavy stones and need frequent clearing. Today this work is carried out late at night when the sewer flow level is low. The grit is either dug out by hand and winched up into a skip lorry above or it is sucked up by a lorry on the surface. The catch tank used to be part of the public tour but this involved climbing down a 10 foot vertical ladder and health and safety regulations now forbid this. It is considered safe to climb up a vertical ladder but not down!

We retraced our steps and then along a short passage that brought us out level with the main east - west sewer we had seen earlier. At this point there is an overflow weir (under the Albion Hotel) taking the water into the



Overflow weir under the Albion Hotel.

large diameter brick-lined overflow sewers. These consist of two parallel tunnels about 9 feet in diameter running from Old Steine Gardens, by the Royal Pavilion, to an outfall beside the Palace Pier. These days, water would only enter the sea in extreme and prolonged storm conditions. A short distance along the overflow sewer is a vertical shaft, 100 foot down into the overflow tanks beneath the beach. These tanks have only filled up on two occasions. From the weir we descended a flight of stairs into the overflow sewer itself which to the north was circular and to the south was barrel-shaped.



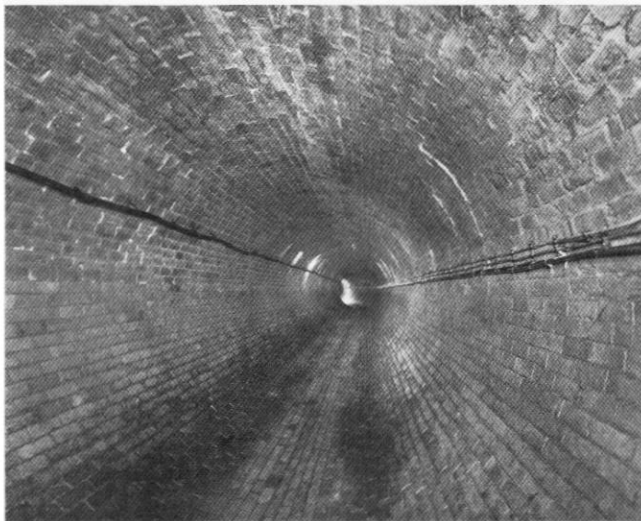
Barrel-shaped sewer.

We retraced our steps and descended another flight of stairs into the second parallel overflow sewer. High on the wall here is a high-water mark which indicated the height of the high tide. Before the overflow tank was constructed the sewers used to be open to the sea and at

high tide the sea water would flow back into the sewer and up to this mark. This has now been stopped by gates that are only opened in emergencies.

We made our way down the storm water overflow sewer; there was a little water on the floor but this is from natural springs and we passed one of them jetting a stream of clear water into the sewer. This wide tunnel is about 200 yards long running north - south. We passed a smaller overflow sewer to our right that joined our tunnel, then another one that had been bricked up. Eventually we emerged in a vast brick-lined underground chamber where we rejoined the second overflow sewer. On our right, behind a wall, was an active intercepting sewer running in its own channel and at the end of the chamber, which must have been 100 feet long, this sewer diverged, one arm running along London Road as far as the railway viaduct and the other running along Lewes Road.

We had reached the end of our tour. A short ladder, a flight of steps and another short ladder and we emerged in the sun on the edge of Steine Gardens. We walked back to where we had entered the system to collect our belongings and leave hard hats and tallies.

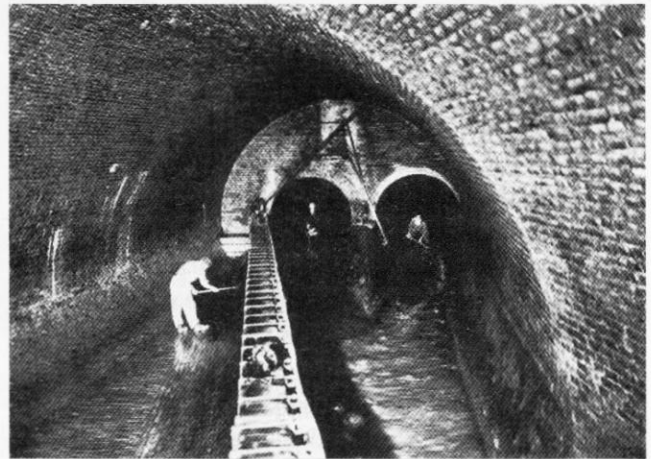


Overflow sewer

HISTORY

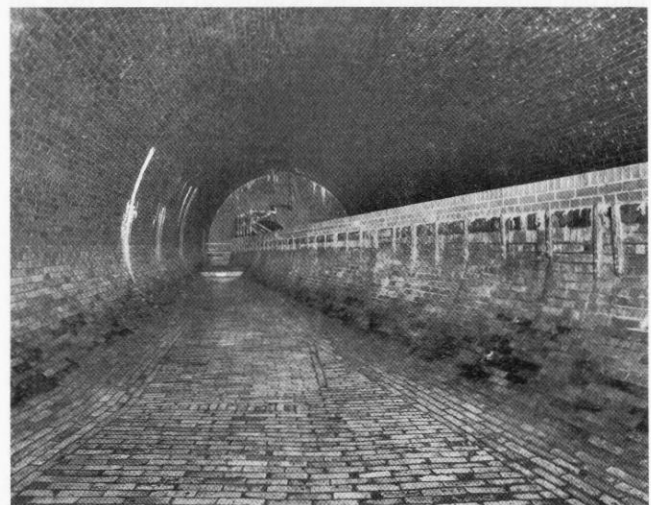
Early in the nineteenth century the town of Brighton, then known as Brighthelmstone, had a population of around 7,000. By 1849 this figure had risen to 60,000 and many of today's familiar places were being built, including the Royal Pavilion, the Volks Railway, the Aquarium and the Brighton Pier. Just before 1860, the town decided that all of Brighton's waste water should be drained into the sea. Until then the sewage and household wastewater was mostly drained into cesspools at the back of dwellings. At this time very few sewers had been laid. The few that existed were 9ft diameter, constructed of 4.5in brickwork in lime mortar and known as gun barrel drains. Some rain-water sewers were constructed of hewn chalk with a slate bed and discharged directly on to the upper parts of the beaches. It was forbidden to connect

household drains to them, although many illegal connections were made and the outfall pipes were gradually extended further out to sea. Following detailed surveys by the town council, work began in 1865 to improve the systems. The old streets were drained into three outfalls, one at the western boundary, one at the town centre (Albion) and one using an existing outfall at Black Rock. Each was provided with an overflow weir which would operate in times of heavy rain.



Intercepting sewer in 1874

About 44 miles of sewers were laid ranging from 12in diameter salt-glazed ware pipes to 8ft circular brick tunnels. The inhabitants of Brighton were not content with this outfall arrangement and, in 1869, public pressure grew for an intercepting sewer; a main trunk which other sewers would drain into and which would take the waste water out of the town altogether. When the council officials consulted several engineers they received a wide variety of proposals, including extensions to the existing outfalls, an intercepting sewer with an outfall to the west of the town near the present Hove lagoon, and an outfall at Saltdean. Sir John Hawkshaw suggested the scheme



Intercepting sewer today

which was subsequently adopted, an intercepting sewer draining into an outfall near Portobello, which was then nearly four miles east of the borough boundary. This

generated much controversy locally and it became a hotly argued election issue. An Act of Parliament was obtained in 1870 forming a body called the Brighton Intercepting and Outfall Sewer Board. The board accepted a tender of £80,000 from Mr Matthew Jennings and work began in January 1871, but it stopped in May when contractors could not cope with the volume of water encountered.

A new contract was awarded in August to Messrs John Aird and Son and the work was finally completed in June 1874. The cost to the board was £104,608 but Messrs Aird lost £40,000 because they too had trouble with the amount of water encountered. Thirteen pumps of 20in diameter were driven by nine engines to pump an estimated 15 million gallons every 24 hours. The resulting intercepting sewer is circular, made of brickwork, 5ft diameter from Hove Street to East Street and 7ft diameter thereafter to Portobello, a total of 7 miles. At the Old Steine and Black Rock storm water overflows were built.

In 1865 an additional ventilator was added to the system at Rottingdean, incorporating a building which was a replica of the many coastguard cottages at that time. Many years later, this was demolished and a modern bungalow was built in its place. Another shaft, erected in 1876, was topped with a chimney standing 102ft above the cliff top at Roedean. A coke furnace was kept burning 24 hours a day to draw a continuous flow of air through the sewer. The chimney was demolished in 1933.

At Rottingdean High Street the sewer is 50ft below ground and receives the wastewater of Rottingdean by way of a catch tank. Up to this point the sewer has a gradient of one yard per mile, but from here to Portobello the gradient is one foot per mile. As Brighton continued to expand, the sewerage system was extended to include the new streets. Following a severe rainstorm in 1892, it became obvious that some of the trunk sewers would have to be enlarged and a system costing £25,000 was implemented. Repairs were also carried out to the King's Road sewer which was described as being old, although the original construction date was not known. Serious flooding also occurred along Lewes Road and this prompted the construction of the relief sewer in 1929.

As the urban area has expanded, so has the sewer system; 300 miles of main sewers now exist beneath Brighton and Hove. Responsibility for the operation and maintenance of the sewers passed from the Brighton and Hove Intercepting and Outfall Sewers Board to the Southern Water Authority following the Water Act of 1973, then in 1989 to Southern Water as part of the privatisation of the water industry.

Taken from :- '*Brighton's Magnificent Sewers - A Victorian Underground Masterpiece*': published by Southern Water

A Ticklish Operation in 1899 at Kenley Waterworks, London Borough of Croydon

Paul W. Sowan

The East Surrey Water Company (now the Sutton & East Surrey Water Company) was presented with a problem at Kenley in 1899. A drought the previous year had resulted in a lower than usual water-table, so it was decided to lower the pump buckets in the several boreholes, to ensure they continued to function (for which purpose of course they had to be below the water level.) This operation was successfully carried out for all boreholes save one which, fortunately, had been maintained only as a stand-by bore since the erection of a new pumping house in 1892. There was therefore an uninterrupted and adequate supply throughout the accident and its remediation about to be described.

The borehole in question was 300 feet deep, and in its upper part had a cast iron lining of 18 inches internal diameter. During work to lower the pump buckets a part of the lifting gear broke, and pump components (technically described as 'pump trees') fell down the hole. Fortunately, they did not fall the full 300 feet, which would of course have made their recovery exceptionally difficult. They fell only 50 or 60 feet, and then somehow got jammed. What prevented them from falling the remainder of the way to the bottom of the hole could not be

ascertained from ground level, and their recovery had to be planned in such a way that they were not accidentally precipitated the rest of the way down, taking the pump buckets with them.

The entirely successful solution adopted was to sink a larger diameter temporary shaft, 66 feet deep, close to the borehole, to allow workmen to reach the underside of the fallen pump trees by way of a mined drift or side passage. Holes were driven through the iron lining and bars inserted to make sure the trees could fall no further. A second side passage was then made at a higher level, and a hole cut in the borehole lining, so that lifting tackle could be securely fixed to the lost equipment, which was then lifted clear.

Thus east Surrey gained yet another piece of underground history - a shaft and two short tunnels. Whether these are backfilled or simply capped is not known.

The Kenley works continue in operation on the west side of the A22 Godstone Road a short way to the south of Purley, at TQ 3260.

Source: 'Repairing a deep well pump', *Water* 1(5), 178 - 181 (1899) [Reprinted from *The Engineer*]



Cwmorthin Slate Mine

Dom Jackson

Cwmorthin slate mine is situated in the hills above the village of Tanygrisu in North Wales. The mine was worked from the early 1800s to 1980s and even today contains lots of evidence of its previous inhabitants. I first became aware of the place in 2001. I found myself in the area with a group of scouts and we were being shown around another mine, Wrysgen, in the same valley. As we came out, I asked our guide if there was anything else underground I could look at. He pointed to a few small pine trees in the distance and said, "There's an old chimney there that leads to a big underground slate mine". I never got the chance to take a look and forgot all about until a few years later.



Early on an April morning in 2008 I found myself heading up to North Wales. The purpose of this trip was to finally visit the vast underground workings of Cwmorthin. Arriving at the car park at the bottom of the old tramway, I was greeted with a very steep incline to walk up and this in turn leads to Llyn Cwmorthin.



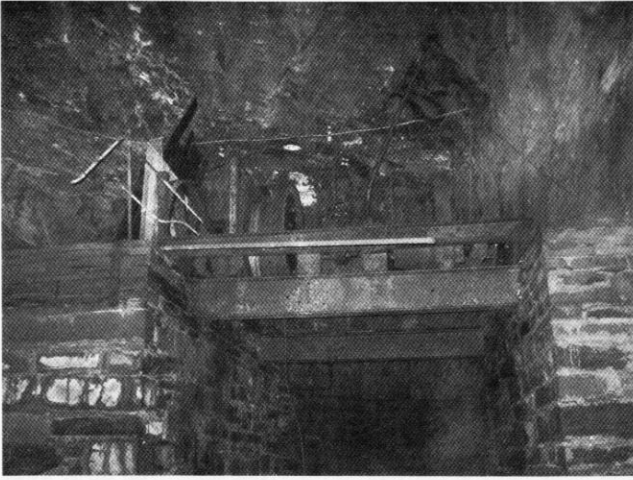
In the photo, you approach the site from bottom right. The shed in the middle of the picture is the old slate-dressing shed. Once on the flat it's a pleasant walk to the main gated adit into the mine, which is called Lake Level. Arriving at Lake Level you are greeted with a very substantial red gate that was fitted in 2006 (more on how to gain access and the rebuilding of the adit below).

Once through the first bit of the adit, it opens up into a reasonably sized passage. (see photo above, of view from gate) The first point of interest you come to is some slate steps leading off into a dark void. These lead to the

lower levels of the mine. Once beyond there the caverns open and you find yourself at the top of a steep incline. This leads off into the depths of the mine as well as the steps that were passed earlier. Once finished on the upper levels it was time to head down and after a couple of inclines and ladders have been negotiated you reach one of the main levels in the mine. All of the levels have names but I can't remember them now as there are so many! At this point this was as all new ground to me and I didn't take it all in as I was so amazed at what I was seeing. A couple of old boilers live right next to one of the inclines, and one of these has been modified to provide the miners with hot water to make tea!

The tea-making kit can just be seen behind the left hand boiler. As it was very still, any dust that was disturbed hung around a long time and made taking pictures very hard. A short walk along yet more tunnels leads to an old winch house (see photo next page, top left).

This is at the top of yet another incline. This incline leads to the flooded bits of Cwmorthin and further



exploration from here on needs scuba gear. We spent a bit of time in this area looking at all the artefacts left behind by the miners. (see photo below)

All too soon it was time to head off back to the surface. There is loads to see at Cwmorthin, and if you get bored with this mine there are another three in the same valley.



Footnote

In late 2007 I had visited the mine, but not on a sightseeing trip. Volunteers were sought by the Friends of Cwmorthin for a spot of rebuilding work on the adit. So it was on a very, very wet and cold November morning that I found myself lugging camping kit and large packs of bacon up to Lake Level for a weekend of 'fun'!

The main reason for our being there was to sort out the mess of a roof in the adit mouth. (See below for before and top previous page for after) The day started with a nice easy timber just outside the gate; this is easy methinks, but nine hours later I wasn't thinking that. The main problem can be seen in the photo. There were lots of split props and beams, and lots of loose rock ready to fall on unsuspecting heads. This damage caused the collapse that nearly sealed Cwmorthin back in 2005.



The day progressed well and along with the timber we also pushed/rammed/hammered any steel work we could find above the timbers to take as much strain as possible. The last beam of the day was of course, the hardest to do as it was supporting pretty much of the tip above! A 10-ton jack helped ease the cross beam in place. This took a while as after every three or four pumps of the jack a few more bits of rock fell out of the roof. We waited 10 minutes between rock showers and eventually got the beam in place. Finally after a very long day we ran out of new props and retired for the evening to large amounts of pasta, beer and sleeping! A very enjoyable weekend but I now have a great appreciation for the conditions that miners had to put up with day in, day out. Since the pictures were taken, more of the old timbers have been replaced.

Friends of Cwmorthin

The above group was formed in late 2005 as a result of Lake Level adit suffering a major collapse. A plan was formulated to repair the damage and the owner of the land was approached. Due to his concerns about his liability with people exploring the mine, one of the conditions was that a gate had to be fitted. The gate is locked but the combination is easily available. For full details on Friends of Cwmorthin and much more information, go to www.cwmorthin.co.uk. The Smoke Flue adit is now also gated, the work taking place on a very wet weekend in the middle of October.

(Photos by Dom Jackson.)

D-I-Y Cut-and-Cover in the Alps

Julian Allason

There may be nothing new under the sun - or far from its rays - but a novel variation of cut-and-cover is being used on precipitous mountain roads in the Alps.

In the far north of Italy, just a few miles south of the Swiss border, a steep gorge divides two mountains southwest of Chiavenna. A little-known private road is carved into the northern side of the pass. In places it narrows to little more than a four-metre ledge above a precipice, and guard rails are intermittent. Which makes for exciting driving in the rare event of an oncoming vehicle being met.

The problem is evident: falling rock and scree, especially when the snow melts. Since the road is owned and maintained by inhabitants of two alpine villages, now chiefly holiday homes, public money is unavailable.

So there is no question of a conventional bore. And the rock appears too subject to fissure to support a cantilever.

The cheapish-and-cheerful solution arrived at is to construct a frame of girders rising vertically from both sides of the road with an angled roof at the same inclination as the mountain, ie 60 degrees. The roof overhangs the box structure so that any falling stones are projected well clear of the road and down into the gorge, where intrepid canyons may be enjoying getting wet and cold as they abseil down waterfalls.

Interestingly some of the same mountaineering techniques, such as the Flying Fox, have been employed by both engineers and canyons.

The outer girder frame is being infilled with mesh to be followed by sprayed concrete. It is anticipated that this should have the strength to withstand the impact of a skid - very

possible in the icy winter - but without bearing too much weight onto the ledge. In any event the load is spread evenly along the section of road by the base steelwork. The result is a tunnel protecting the road from rockfall, and perhaps drivers from vertigo.

One of the villages is on the opposite side of the ravine, which although narrow is crossed only by footbridges. Donkeys are still employed to carry goods up to the villages, and are, I was assured, eventually turned into salami. Simple goods cableways are used to convey larger and heavier items, such as construction materials and wine up to each village, as it has proved impractical to drive the road higher without unaffordable engineering.

As a private road it is exempt from EU regulation. Hence the complete absence of road marking and warning signs on the route. But how, anyway, is one supposed to react to signs warning of rockfall? Or indeed donkeys at work.

The do-it-yourself double cut-and-cover technique observed here appears to have been inspired by the box tunnels added to sections of the historic Swiss Rhatische Bahn mountain railway that ascends from Chur to the Engadine Valley amidst dramatic scenery. Here the problem arose when heavy avalanches resulted in snow and rubble obstructing the track to a depth beyond the capability of the snowplough and 'egg-beater' technical engines to clear. Also constructed of concrete these 'tunnels' usually have arched windows to which steel grilles have now been added to keep chamois from sheltering in them. Entry via the tunnel mouths is still possible and fresh venison can occasionally be purchased from railway staff.

Hopewell Colliery Mining Museum, Cannop Hill, Speech House Road, Coleford visited Saturday 19 July 2008

P. W. Sowan

This small establishment, opened to the public by the owner and free miner Robin Morgan on 7 August 1997, offers underground tours, some mining equipment at the surface, and a small display of artefacts, photographs, etc., with an adjoining small sales point and tea-room. The setting is most attractive, with a forest backdrop, on the north side of Speech House Road (B4226) between Littledean and Coleford, about two kilometres west of the Speech House Hotel. There is a nearby bus stop served by Gloucester - Cinderford - Coleford buses. Cap-lamps and helmets are supplied.

The underground tour descends a concrete-floored slope-shaft, beyond which the route is along a level roadway for about a kilometre. Points of interest seen are a small section of working face on a thin inclined seam (Coleford High Delf seam), a number of methods of supporting the mine ceiling including some fine drystone arching, an underground stream, and an old ventilation furnace site. The tour exits in

an attractive forest setting, whence one walks back to the mine buildings over the hill along the route of the Howler Slade tramway of 1812 with stone sleeper-blocks *in situ*.

Hopewell has been described as the most interesting of the seven surviving free mines, of which two were producing in 2007, two (including Hopewell) were 'under development', and three retained on a care and maintenance basis. The last deep mine in the Forest of Dean, Northern United near Cinderford, closed in 1965. Robin Morgan started work in the mines at the age of 13, and hasn't stopped in the last 60 years.

The museum is open daily from Easter to October, with tours from 10.00 to 15.00. Telephone 01594-810706 or 01594-832216 outside opening hours.

REFERENCE: Ian Hayes, 2008, *Free mines on the Forest: the Forest of Dean coal mines at the commencement of the New Millennium*. 2nd edn. Redditch: author: 16pp.



Subject: Munich (yes, it's not Berlin)

Tim Robinson

In this age of electronic mail there are always those emails you steer clear of. You know the ones, "Congratulations, your brother in Uganda has \$35m for you. Please send your bank details". However, there are also ones you leap on immediately, particularly if they include in the 'subject' line the word Berlin. It was therefore with some interest I noticed an email from Mike Barton and Robin Ware but with Munich as the subject. A bit early for the Christmas markets, I thought, maybe something underground?

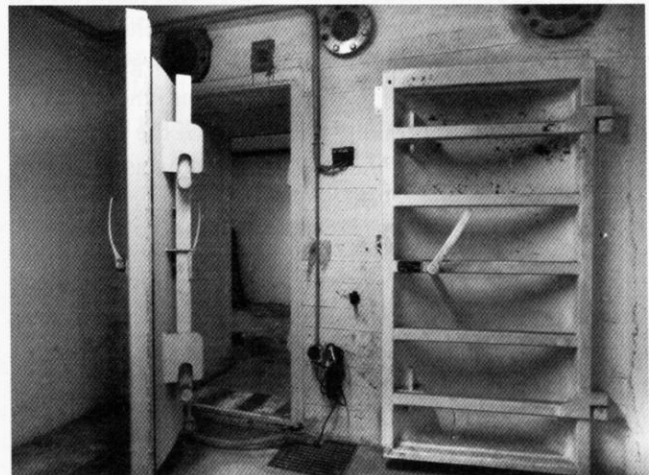
Well, true to form it was and after an evening flight and train ride our group (Mike, Robin, Jane MacGregor, Bob Clary, Nick Catford, Steve Underwood and myself, Tim Robinson) headed towards the red light district, assured by Mike the hotel didn't come with 'company'. What it did come with was a very nice Turkish bar across the road where we retired to after the usual hotel formalities. Over curry, bratwurst and beer we discussed the proceedings for the next couple of days. We were to see some World War Two / current-day civilian shelters together with a large 'control bunker' which was owned by the federal government. They had very recently sold this to the local Munich authorities - it was now due for demolition and rebuilding as a major fire brigade centre by 2010 - so we were likely to be amongst the last people to be able to visit this. With the clock passing midnight we wandered back across the street for some well-earned zeds.



The group in a dormitory in the shelter under the 'Big O'.
Photo by Robin Ware.

After a hearty breakfast buffet, Bob and I took a short wander through the Munich streets aiming to meet everyone at the 'Big O', a large red oxide 'O' standing in a local square (it's art apparently). Our guide for the two days - Herr Geissel - arrived shortly afterwards in his bright orange 'Katastrophenschutz' Opal and gave a brief explanation as to what we would be seeing for the

day. Our first visit was right where we stood, under the big 'O' and was a civilian shelter from WW2, now upgraded for current-day use. We descended through some metal floor panels into a clean and brightly lit space with the usual blast doors at the bottom of the stairs. It had capacity for around 100 people and consisted of a spine corridor with a series of rooms off each side. Although nearly all empty, these would have been filled with beds three high when in use (there was one set still in existence) with WC and washing facilities midway along the corridor. At the end of this corridor was a plant room, access to the black sand filter beds, secondary shelter access and a small workshop / store. In here were shelves stacked with various provisions including a large supply of body bags. Herr Geissel gave us a demonstration of how the air circulation system worked and allowed the more energetic ones to have a go too (chairs were provided for their recovery afterwards!). After final photos we headed back through the airlock and out into the bright sunshine.



Entrance into the shelter.

Under the Station

Our second port of call was in the main station, just a short walk away. This was another civilian shelter accessed from the lower mezzanine level of the station - in fact off the public toilets! Much larger than the previous one, we were told its capacity was several hundred people. Once through a large, nondescript metal door, stairs led down to a lobby. Passing through the normal blast door / air-lock / blast door configuration we arrived in a long corridor. The corridor was clean and reasonably well lit with long rooms leading off it. At its end was the usual secondary access with more blast doors and air lock. Although we did not open this access it was clear by the sounds that it opened into the passenger routes in the station. The long rooms had tiled floors giving them an almost clinical feel but did not show any evidence of where the beds would have been set-up. However,



Shelter. under the station.

plumbing outlets were in the floors and after some quick translation by Mike, we learned these were for basins when it was used to house immigrant workers at the end of WW2. The majority of the workers were of Italian descent and it was therefore not much of a surprise to hear that it was known as 'Little Italy' by many of the Munich residents. The plant area was to one side of one of the long rooms and consisted of the same hand-driven air circulation equipment as the previous shelter. As with all of these shelters, the luminous lines for guidance in the event of power failure were present around all doors and along the main routes. Being one of the last out of here it was nice to see their welcome glow as the lights were turned off.

Just across the concourse we were led to another flight of stairs with a rather impressive looking yellow and black striped door at the bottom. This, we were informed, was an underground car park which in the event of a major catastrophe, would be turned into a huge dormitory shelter for up to 3,000 people. There was the usual airlock set-up and then we were into the main shelter which, to be fair, looked like a huge car park! Closer inspection however, showed the canteen hatch doors where many thousands of meals would be provided to the sheltering populace. With the ceilings fairly high it was hard to see how the beds would be configured but it would have certainly been a sight, all set-up, and ready for occupation. Huge electrically operated blast doors stood ready to close off the vehicle access ramp and although we did not get to see them, it was safe to assume there were huge plant rooms hidden away. There was certainly extensive air conditioning ducting which was far more than you would need for a normal underground car park.

Mike and Herr Geissel were acting as chauffeurs for this trip and so a little drive was next on our itinerary. This was via the still standing Führerbau Building, Hitler's Party building. We could not go in as this is now occupied by the Munich School of Music but had a brief wander outside. The canopied entrance doors still had the original decorative mosaic ceilings (swastika-inspired some say)

and the fixing points for the Nazi Party eagle were still visible. We were told there was a shelter under the building but this was not accessible today (you could sense a slight sigh at that news!). Nonetheless, this was an important building to see and reminded us of the huge amount of history still visible in this city.



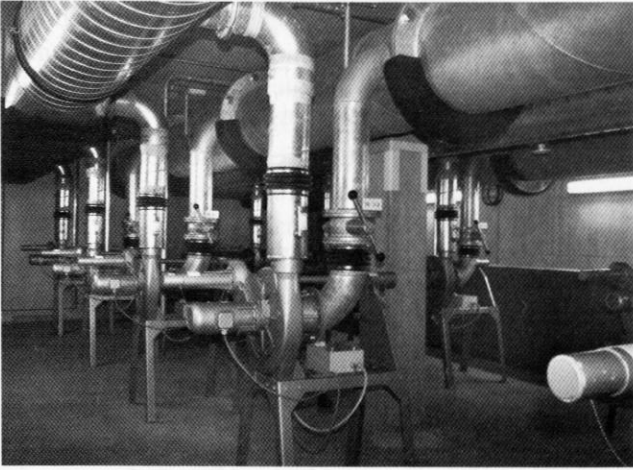
Car park shelter.

Back on the road we took a short drive to another office block and down into the car park. This was a similar set-up to the third shelter we saw but on a smaller scale, although you would not think it by the number of beds they have in storage! We asked why they were still kept if the risk was reasonably small nowadays and the answer was simple. "*Where else would you put them and why throw them away*". Fair enough I thought! At the end of the main car park was the serving hatch from the kitchen and behind this the caged stores and plant rooms complete with freshwater well. The filter room lacked only the filter units (stored elsewhere) but did have the familiar pile of radiation-absorbing bricks for when things really get out of hand. Heading back to the cars we had a quick look at the blast door mechanism which, as to be expected, was heavy-duty and fully working.

To the Olympic Park

Our final destination of the day was over towards the Olympic Park area. The sun was beaming down by now and temperatures on the up. For me this meant only one thing, time to expose my legs (the bottom half you understand). Clearly shocked by this apparition the group were eager to get into the shelter. If they had hoped to keep me on the outside they were sorely disappointed!

As if to finish on a high, this location was a double header! Firstly, it was under another office block which was only just 4 years old. We were told that it's normal policy to have the car park dual as a shelter and that nearly all new buildings have these features (there are some 31 shelters of various size across the city, of which pro. 21 are in the form of this 'multi-purpose facility'). The theory was similar as before but with lower ceilings the sockets for the beds were visible and clearly defined areas for showers, WCs and basins could be seen. Ceiling valves



Air conditioning and filter room.

showed where drinking water outlets would be attached. The a/c and filter rooms looked like they had just been installed; everything was immaculate and ready to go. The same air circulation units were here but this time they were electrically operated, no recovery chairs required this time! The stores were well stocked although curiously the size of the kitchen seemed very small for the numbers it was designed to cater for (not actually mentioned). The entrance blast doors appeared to be manually operated although we were assured they could be closed very quickly. Across from these was the secondary access through the usual air lock and a very nice marble staircase up to ground level.



Former WWII flak tower. Photo by Steve Underwood.

Diagonally across the road was our last site for the day. This was an octagonal, seven-storey building, formerly a WW2 flak tower / shelter and now just a shelter but would not look out of place in a medieval film! Access was via a heavy-duty steel door and straight into a small airlock / blast door set-up. Inside was clean, extremely

well lit and completely white. The main feature of each floor was the staircase and landing with various odd-shaped rooms leading off. Remembering my first exploring lesson from Bob, I headed for the top floor with the intention of working my way back down. Arriving at the top landing I was presented with rooms to the left and right and a ladder going up. Grabbing the essential tripod and camera I climbed up, turned through a narrow short passage and into the roof space. Added at a later date, the timber roof structure was very impressive with exposed rafters and small windows affording good views across the city. The central concrete core had once supported the flak guns (no details of calibre or numbers) but now provided support for the roof. In time the rest of the group made it up and we spent a good 15 minutes peering out of the windows and around the space to see what we could find. Eventually we made our way back down and after a quick discussion, headed outside again.

After bidding farewell to Herr Geissel, Bob, Steve and I opted for a wander over to the BMW museum whilst the others took advantage of a lift back to the hotel with Mike. We spent a relaxing half-hour drinking tea and chatting before meandering back to the hotel via another shelter tower (locked but with camera access through a window) and a beer or two. Evening sustenance was taken at a local beer hall, enjoying excellent food and beer whilst listening to some impressive thunder outside.

Fortunately the rain had eased off when it came time to retire and so Day 1 was pretty much over save a nightcap at the Turkish bar!

Centre for Catastrophes

Day 2 dawned bright if not sunny. Our destination was the control bunker that had just changed ownership and required a reasonable walk across town to the location. This was in fact, quite interesting as it gave us another view of Munich that the tourist would not normally bother with. Eventually we arrived at an ordinary-looking office block in a typical Munich street and shortly after, Herr Geissel and another of his colleagues met us, brandishing a purposeful-looking set of keys!

The official title for the bunker is "Zentrum fur Katastrophenschutz" which roughly translates into "Emergency Aid Centre".

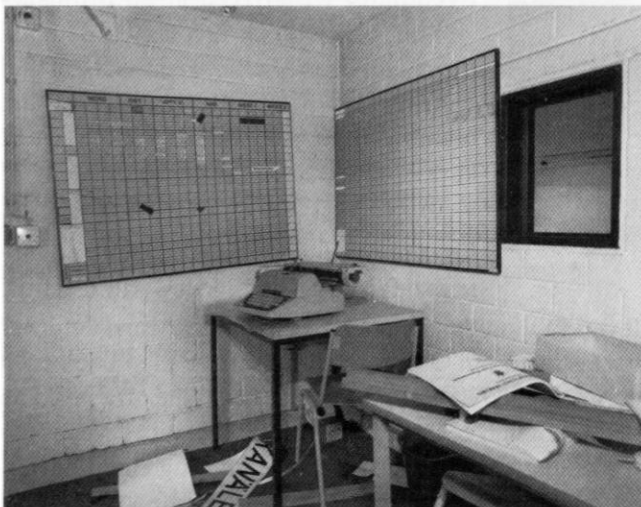
It was built in the early 1970s against the usual cold war background but could potentially have also been used during the 1972 Olympic Games. It was the official home of the Munich Technical Emergency Services whose job it was to provide technical support during emergencies. Its total area was some 15,000 sq. m. allowing around



Situation room.

3,000 people safe accommodation for up to 14 days. Like many shelters we had already seen this doubled as a car park / garage area in peacetime. Huge blast doors could seal off this entire area giving ABC (Atomic, Biological & Chemical) protection with shower and WC facilities nearby.

With everyone keen to see what was behind the office façade we headed round the back and into the main stairwell. This initially led down two levels before the familiar blast door welcomed us. Our first stop was the main power room where a superb electrical panel the length of the wall was complete with glowing indicator lamps, gauges and huge fuses. Herr Geissel flicked the switches and we were greeted with relays clicking and all sorts springing into life. Fantastic! The adjacent generator room was sadly bare and with the floor above it missing it was not hard to work out how the generators had been removed. We then started a general tour of this service level visiting air-conditioning, pump, water supply and filtration rooms to name just a few. Again, the sheer scale of equipment to allow people safe shelter was mind boggling, let alone the cost. With the majority of it looking almost new – it was never used apart from in the occasional exercise – it seemed such a waste that it was all due for demolition. Up another level we came



Office.

to the administration and control areas of the bunker. Map rooms with communication suites were evident as were general office and dispatch rooms, complete with telephone directories from 1989 - 1990. Whilst most rooms could be easily identified some were a mystery, being devoid of any kind of furniture or fittings. Vast, bare concrete areas – presumably stores - led to long corridors, quite a labyrinth to the first time explorer.

Back to the Surface

In the secondary exit corridor a flight of stairs led up and following this we arrived in the garage area. Huge was putting it mildly so it was pleasing to see some lights on giving us a chance to see the extremities. Access from the outside was via two vehicle ramps and two, stair-cased, personnel shafts. The majority of the walls were painted an army green with striped black and yellow blast doors. Leading off this area were the shower / WC blocks and some other admin and locker rooms. The sinks and WCs still had plastic covers over them giving a sense of readiness whilst racks of shower heads waited to be connected to the existing plumbing so the basin areas could double up as shower rooms. We passed the all too familiar decontamination areas with showers, boot scrubbers – nothing fancy, just bristles sunk into a concrete tray – and observation windows. In one room, plans lay scattered over the floor which did give us some sense of the size of the place although should it have been put into use I'm sure the walls would have closed in very quickly on the 3000 occupants.

Returning to the surface via the main staircase, we crossed the vehicle yard and entered the surface garages. They pretty much mimicked the size of the underground ones and this really brought home the scale of the place. A small area was being used to store a variety of palletised goods but the space was otherwise empty. Number plates hung from the roof showing where particular vehicles would have stood and outside three petrol pumps were on hand to top up their tanks. A wander round the perimeter of the garages confirmed the location of the personnel shafts which were blocked with earth and the vehicle ramps which were blocked off with their steel shutter doors.

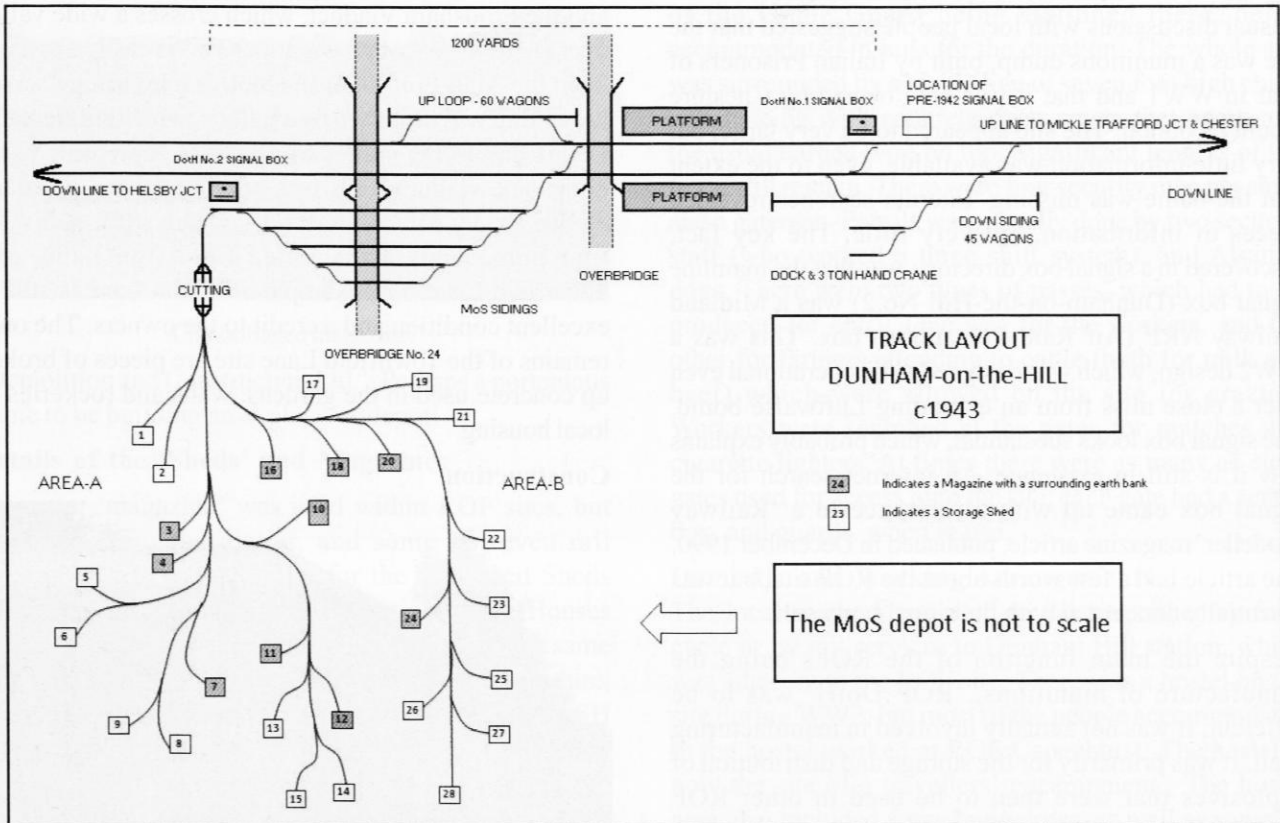
Time was now pressing so final outside photos were taken and we left the site, very satisfied. After farewells and thanks we headed back to the hotel via a well earned lunch stop. The afternoon was free but Mike had expertly booked us a table at Hitler's favourite haunt, the Hofbrauhaus, for our evening meal. The food, atmosphere, décor and service were superb and it was a fitting end to the trip.

Huge thanks go to Mike & Robin for organising the visit and putting together such a varied and interesting programme. I'm sure we have only scratched the surface so Munich 2 must be somewhere in the pipeline!

(Photos by Nick Catford unless stated.)

Royal Ordnance Factory Dunham-on-the-Hill

Phil Pritchard



Royal Ordnance Factories – a Summary

The title ‘Royal Ordnance Factories’ (ROFs) was the collective name of the UK Government’s munitions works during, and after, WW2. Until privatisation, they fell initially under the MoS (Ministry of Supply), and later the MoD (Ministry of Defence). Some factories were built and run by the government, others were built and owned by ICI, but these were not considered to be part of the MoS ROF organisation, and were not called ROFs. Other MoS-funded factories were managed by ICI, and were known as “Agency Factories”. During WW2, new ROFs were constructed, usually in areas that were considered “safe”, i.e. northwest of a line drawn from Bristol to Haltwhistle (Northumberland) and then to Linlithgow (west of Edinburgh). There were however exceptions to this geographical rule.

The three main types of ROF were:

- Engineering
- Filling
- Explosives

These three types were also the biggest, as the buildings had to be widely spaced.

The other three types were:

- Medium Machine Shops
- Small Arms Ammunition Factories
- Rifle ROFs

ROFs tended to be self-contained, with regards to power, accommodation, and other domestic arrangements. Some were designated ‘temporary’, i.e. only extant until the end of WW2, and others were ‘permanent’ – which continued in use after WW2. These WW2 survivors eventually succumbed to a wide range of fates, the later surviving ones becoming part of QinetiQ.

Introduction to ROF Dunham-on-the-Hill

This is a puzzling site. It is easily visible from the M56, travelling in both directions. The most frequent view is of the two brick “sheds” seen when travelling past the Helsby turnoff towards North Wales. They are obviously too big to be normal agricultural barns. One end is apparently intended to be driven through, but at the same time is far too big for even a modern heavy goods vehicle. They look like a ‘typical’ WW2 structure, but not quite. After driving past several times, it is then obvious that there are other “sheds”, scattered around the fields. Some are the same, some are not quite the same; some have earth banks, some do not; some have standing brick walls, some do not.

The examination of aerial photographs reveals a considerable number (28) of the ‘sheds’, and visual hints of tracks connecting them. They look military, and the distance between structures suggests an ammunition storage area. The map shows the internal layout, perimeter fence line, the railway line, the numbering of

the sheds, and the route of the modern M56 motorway. This particular ROF depot is often marked on period maps as 'B.E.', i.e. a 'Bulk Explosive' store.

Casual discussions with local people suggested that the site was a munitions dump, built by Italian Prisoners of War in WW1 and that it was now owned by Cheshire County Council. The site appeared to be very large, but very little information was available, even to the extent that the name was missing. Internet searches revealed pieces of information, but very little. The key fact, discovered in a signal box directory, was that the mainline signal box (Dunham-on-the-Hill No.2) was a Midland Railway ARP (Air Raid Precaution) box. This was a WW2 design, which was designed to be operational even after a close miss from an exploding Luftwaffe bomb. The signal box looks substantial, which probably explains why it is still in existence. An internet search for the signal box came up with a reference to a 'Railway Modeller' magazine article, published in December 1990. The article had a few words about the ROF site, but was essentially concerned with the signal box itself.

Despite the main function of the ROFs being the manufacture of munitions, 'ROF DotH' was to be different. It was not actually involved in manufacturing at all. It was primarily for the storage and distribution of explosives that were then to be used in other ROF establishments as fillings for shells and munitions. The DotH site was built on a site requisitioned in 1941 for the war effort, on behalf of the Ministry of Supply (MoS) under the 'Emergency Powers (Defence) Act 1939'. Construction of the site started on the 7 June 1941, completed on the 5 August, and was open for use on the 11 August 1941. The supplies were initially received by the nearby, and already existing Dunham Hill Station goods yard

The Role of ROF DotH in WW2

The main role of DotH during WW2 was for the storage of explosives, as follows. Explosives were shipped into the Mersey ports, for use during the war. The geographical position of DotH was carefully chosen to be in a very good strategic position on the railway lines in the area. It was in a position to receive the explosives and munitions, and to then store them for further distribution to other ROF factories. The workers recollect shipments from Canada, and distribution to ROFs at Fazakerley, Rhydymwyn, Chorley and Chelford. The shipments to Fazakerley would suggest that the shipments were into Birkenhead Docks, rather than Liverpool Docks. The received explosives were mainly Neonite, Cordite and TNT, which arrived packed into cloth bags, which were in turn packed into wooden crates and boxes. There were also substantial quantities of ammunition boxes and cartridge cases, as well as boxes of 'yellow powder'.

This distribution activity made the local railway line very important to the war effort. There are some local defensive weak spots to the railway, namely a cutting, and the Frodsham Viaduct, which crosses a wide valley over the River Weaver navigation. This is easily observed from the M56 Frodsham Viaduct. A road bridge across the cutting was protected by a pillbox, which still remains to this day in the corner of a private garden on Wood Lane. The viaduct itself was protected from air attack by two Heavy Anti Aircraft (HAA) gun sites, each with four guns. They are situated off Aston Lane, and Townfield Lane. The example on Aston Lane is still in excellent condition and a credit to the owners. The only remains of the Townfield Lane site are pieces of broken up concrete used in the gardens, walls and rockeries of local housing.

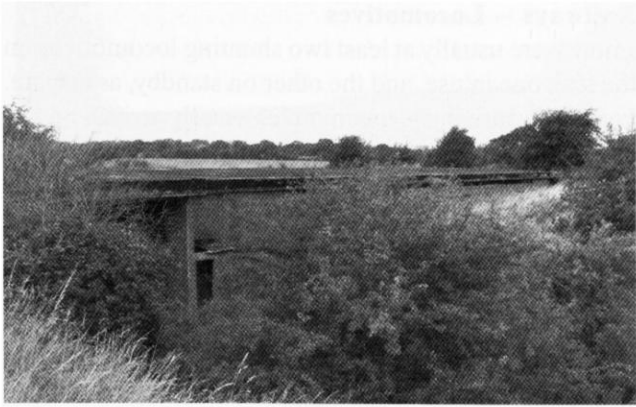
Construction



General shed construction view.

The building of ROF DotH was subject to the usual WW2 secrecy, and misinformation abounded. One quantity surveyor that worked on the project stated that it was an 'Empty Component Store' and that it was to be associated with Risley ROF No.6, and the nearby Hooton ROF No.10 (still known locally as Roften!). He did query why the buildings were so dispersed, and why some had earth banks surrounding them, but in those days, it was not the 'done' thing to ask questions. ROF DotH was built at the start of WW2, on a flat, marshy area adjacent to the Mersey Estuary. It is between the Hooton to Helsby and Chester to Helsby railway lines. It was intended for the bulk storage of explosives, and as such, had to be remote from centres of population.

The site is roughly about a mile square, but has an irregular perimeter. The storage of the bulk explosives was in a number of brick and steel 'sheds', 28 in total, which included ten which were designated as magazines. The magazines were surrounded by earth and clay blast mounds, with a brick blast wall at the rail entrance as it was a weakness. They are also very well landscaped into the scenery. The earthworks that were used as blast barriers around the magazines were constructed using a narrow gauge railway, with petrol-engined locomotives, which pushed tipper trucks around the site. The main construction contractors were a company called



Camouflaged magazine.

'Demolition and Construction Ltd.'. Perhaps a portentous name to be building an explosives depot!

Details of the 'Sheds' and Magazines

The term 'magazine' was used within ROF sites, but many were much smaller, and some not even rail connected. The correct term for the Traversed Sheds (Earth Banked Buildings) is Explosives Store Houses (ESH). These one-sided ESH buildings are of the same design as could be found at CAD Bramley in Hampshire, and at CAD Kineton in Warwickshire. Some of the ESH buildings have had the earth mound removed by Cheshire CC, and taken away to line the nearby Gowry landfill site. These are obvious, as, where the mound has been removed, it usually leaves a diagonal line on the blast wall. Some of the ESH buildings had a complex shaped earth mound, presumably as some attempt at camouflage.

The sheds are approx 35 metres long, and 12 metres wide (measured at the 'storage' section), and 15 metres wide at the loading dock end. The buildings were constructed of a lightweight steel framework, filled in with a single layer of common bricks. Each building had a small 'sentry' box, on the storage side of the entrance; nearby was usually a concrete pipe water butt, with asbestos guttering and downpipes. The roof was made of very lightweight concrete sections, and covered in asphalt. There were lines of glass lights set into the brickwork at the top of the walls. Each shed had a steel ladder for access to the roof. The sheds did not contain any electrical wiring, lights or fittings, obviously because of the explosion and fire risk.



Magazine with removed earth bank.

Security

Security was the responsibility of the Ministry of Defence Police, but there are also recollections of a detachment of the Home Guard being stationed there, being accommodated in huts for the duration. The whole site was surrounded by a single line of seven foot high chain link fencing with concrete posts seven feet apart, and the usual barbed wire on top. Significant lengths of the fence still remain. There were four security men per shift, and a gateman. Patrols were usually done by two security staff (who worked a three shift system), and Alsatian dogs. There were two types of passes, which had to be produced for entry. One was for the workers, and the other for farmers attending to cattle (both for milk and beef) which were allowed on the site for grazing. Workers were searched at the gates for matches and cigarette lighters. At times there were as many as eight gates used for access onto the site; each gate had a sentry box, and guards, when in use.

Domestic and Working Arrangements

The local workers travelled to the site either by foot, cycle or by rail services to Dunham Hill station, which was adjacent to the ROF site. There was a hostel on the site during WW2, but most of the people accommodated in the hostel worked at ROF Capenhurst. The hostel is now the site of a travellers' encampment. The hostel area also included some bungalows, as well as separate Nissen huts for men and women. There was also a canteen on-site. Helsby Grammar School was also used as a hostel during WW2 for DoH workers, in addition to another hostel at Lowton St Marys, near Wigan. The total number of workers was around fifty, including a substantial number of Irish, Welsh and Geordies. The workforce had a regular skilled core of local people, and a varying number of transient workers. On some occasions, men were transferred by rail between DoH, Beeston fuel dump, Mickle Trafford ammunition dump and Ince petrol dump. During the war years, there were two shifts, 6-2 and 2-10.

Railways – General

The storage sheds were all rail connected by standard gauge track work, and mostly bolted onto concrete railway sleepers. The points were hand-switched. There were around five miles of track, and 30 sets of points. Each 'shed' had its own siding and buffer stop. There was a mainline rail connection (to the L.N.W. & G.W. Joint Railway), and sidings, access to which was controlled by the LMS ARP signal box. The sidings were over half of a mile long, with the longest having a capacity of 60 wagons. The map shows the main line railway, sidings, signal box locations and the connection to the internal rail network, as well as the shed and magazine numbering.

The explosives arrived by rail and the wagons were stored in the sidings until being brought into the site by the MoS 4-wheeled diesel shunters. 'Match' wagons were inserted

between the goods wagons and the locomotive, then they were shunted (usually in groups of four) to the storage sheds, where they were unloaded, one at a time, under cover. The 'match' wagon was to prevent the diesel shunters having to enter the storage shed for safety reasons. The explosives were manually unloaded onto wooden supports, i.e. there was no motorised assistance. There were two small loco sheds on the site, one for maintenance with a pit, the other for storage only. There were two gangs in the engine sheds up to 1949, reducing to nine workers by 1959. The site traffic was very busy until 1944, when the ROF work started to decline. The site had an underground fuel dump, holding diesel for the shunters, and petrol for road vehicles and a personnel tram.

Railways – Signal Box



No. 2 ARP signal box.

To provide control of access into the site, a new signal box was required. This was named 'Dunham-on-the-Hill No.2' and as previously mentioned, was built to 'Air Raid Precautions' (ARP) specification. There were only small amounts of wood used in the construction, and a large amount of standardised pre-cast concrete components. There were very few openings in the walls. The heating was by oil lamps, and drinking water had to be transported there in containers, neither of which was unusual at the time. The roof was a 12 inches thick reinforced concrete slab.

The contractor was 'Cartwright Massey' of Moore, Warrington, and it was built in 1942 at the same time as the construction of the depot. After the war had ended, there was little signalling activity, and it was subject to a temporary closure in 1946, and kept in a maintained condition, followed by complete closure in 1949. It controlled access to the sidings at the east end, and had 20 levers, of which 16 were used. There was another ARP signal box, 'Dunham-on-the-Hill No.1' at the west end of the sidings, built at the same time as No.2. No.1 replaced an 1873 signal box that was too small as a consequence of opening the DotH depot. The No.1 had 40 signal levers, but was closed in 1969.

Railways – Locomotives

There were usually at least two shunting locomotives on the site, one in use, and the other on standby, as a spare. Perhaps surprisingly, locomotives usually arrived on site by road, and were unloaded onto the tracks sideways by draglines and jacks. The Fowlers were reputed to have an awkward 'gated' gear change, and had a conventional starting handle. The Andrew Barclay 'Kent' locomotive had pneumatically operated controls, and required a charged-up air tank for starting. All locomotives wore a dark green livery. They had water exhaust traps, so that sparks could not be emitted from the exhaust, for obvious safety reasons whilst handling explosives. There was also a 'tram' type of rail vehicle, for transporting workers around the site, it featured a roof, and no sides, but was capable of carrying six people (probably not in comfort). It was driven by a petrol engine, and had a friction drive. The driver was always one of the loco men on the roster. However, the 'tram' met with an accident where it was crushed, and was subsequently replaced. There was also a trailer that was used with the 'tram' for carrying small equipment.

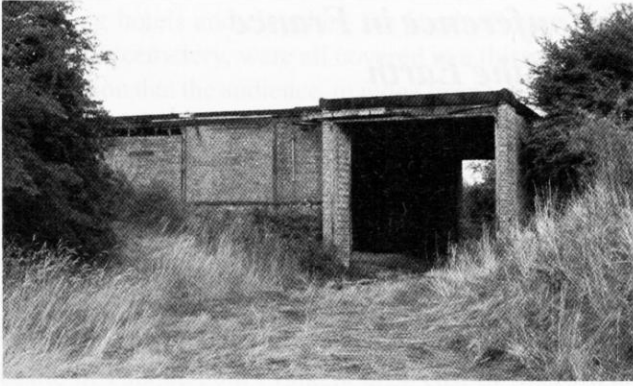
Postwar

There was a regular annual maintenance of the grounds, and some pest control in the spring, which was done by a Leicester company. The site saw little activity immediately postwar, but that was soon to change in 1956 with the Suez and Hungarian crises. During this period the depot was used for the storage of shells, including American shells. The shells included Phosphor bombs. The local construction company (based at nearby Hooton) of McAlpine was employed to rebuild and repair the earthworks around the magazine sheds, and to repair the fences around the magazine earthworks – presumably to keep the cattle off. Additionally the lightning protection was redone, consisting of three bands of one and a half inch copper strip over the roof and sides, connected to another band around the shed, which was in turn earthed to the railway track. Post 1957, the site was used for storing ammonium nitrate in 2 cwt drums. This was stored in the open, and was later burnt off in the open air between 1957 and 1958. The local populace was informed by telephone before the burning off.

Closure

The signal box at Dunham-on-the-Hill station (not the No.2 ARP signal box) was closed around 1956, and demolished soon afterwards. There is a closure notice for the No.2 signal box for 24 November 1951; this signal box was not demolished, and still stands to this day. Dunham-on-the-Hill station closed in 1952.

Track lifting within the site started in early 1963, and finished in 1964. The labourers were bussed in from Walton Jail, in Liverpool. The track leading to the site was left in for the CEGB, who at the time had outline plans for a power station on the site; however, these plans



Magazine.

did not come to fruition, and the track was lifted sometime in 1966/67.

The depot was retained for food storage, eventually ending up responsible to the Ministry of Agriculture, Fisheries and Food (MAFF). This role ceased in September 1985, and in 1990 it was disposed of into the private sector. When used in this latter role, it was known

as a 'Buffer Depot'. The stored food included baked beans, margarine, butter, cocoa powder and dried milk. Local information is that after closure the food was to be stored in 'old mine workings' and was removed by road vehicles. As a 'Buffer Depot', the food was regularly rotated and replaced. The stored food initially included tins of corned beef, but after a batch was blamed for an outbreak of typhoid, the storage of corned beef was ceased. There are also recollections of the depot being used for the storage of machine gun bullets, and other items that were manufactured at ROF Capenhurst, which was only a small number of miles away.

The site was leased by Cheshire County Council, who have located a Travellers' camp on the site. They also used the earth embankments (which were actually clay), as an easily accessible source of clay to line the nearby Gowy landfill site. This explains why some of the 'magazines' have had the embankment removed, and also explains the diagonal line present on some of the brick blast walls where the rail entrance would have been.

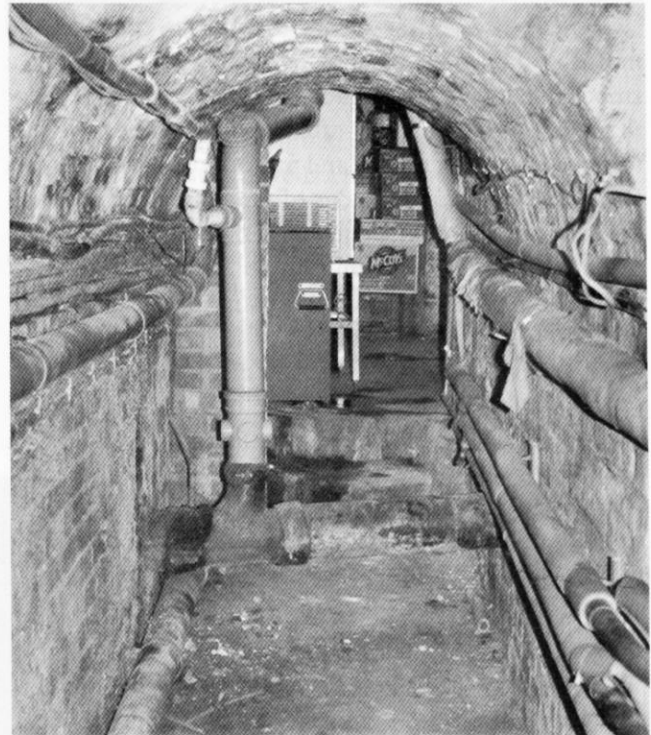
Local Legends - Part 3

John Burgess

Able assisted by fellow Subterranea Britannica member Stewart Wild, I recently conducted a survey of another dozen or so interesting cellars and underground spaces below properties in the High Street of Lymington, in search of the elusive labyrinth of tunnels that are said to exist. Some of the foundations we found were obviously medieval, with wonderful stone walls and flagged floors. As was expected, the majority dated from the Tudor development of the town, with beautiful small bricks forming the walls and floors. At least three had original wells and one had actually been lived in in Victorian times - complete with a locally made cast-iron stove. Disappointingly, there would appear to be only one entrance to the crypt in St Thomas's church and this has been sealed.

The cellar of the coaching inn, *The Angel* was particularly interesting, with a short linking tunnel beneath the coach arch to the annexe. This also had quite extensive cellar space. Unfortunately despite a thorough inspection, no trace of links to other cellars was found. As I reported previously, there was possibly a service tunnel under the High Street, linking the cellars of the two coaching inns. Unfortunately, it doesn't seem to have existed. We came to the conclusion that a bricked-up arch in the cellar wall facing the High Street had in fact originally been a simple delivery ramp from the pavement.

Subsequently, I paid a visit to the local town hall and asked to see the local drain and sewer maps which are available for inspection in most municipal offices. Again, as predicted, the principal drain runs beneath the centre of the road in the High Street and discharges into the river. Despite many people telling me that they had been



Link tunnel beneath the coaching entrance of the Angel Inn along 'miles' of tunnels and that the cellars were linked in some way - sadly we found no evidence at all!

My next move is to publish an article in the local newspaper and ask for information that might - or might not - justify further investigation. We all would love to discover a 'secret passage' but I am afraid that the reality is that there are very few out (or under!) there. However, I would still be delighted to be proved wrong and will keep you all informed of any future discoveries.

Sub Brit represented at SFES Conference in France - Journey to the Centre of the Earth

Stewart Wild

Over the weekend of 18-19 October 2008, our Chairman Martin Dixon, along with Linda Bartlett, Paul Sowan, Gerald Tagg and myself, attended the 31st Congrès de la SFES in Amiens. The Société Française d'Etude des Souterrains is the French equivalent of Subterranea Britannica and its members have been of great help to us in recent years in the planning of study weekends in northern France. As a result, links between our two organisations are close.



SFES Conference attendees - all saying 'fromage'

We gathered at the port of Newhaven early on the morning of 17 October, and in perfect weather enjoyed a smooth Channel crossing aboard the Transmanche ferry to Dieppe. Arriving mid-afternoon in Amiens, we had time to visit the graves of and pay our respects to Group Captain P C Pickard, leader of Operation Jericho, and his Navigator Flight-Lieutenant 'Bill' Broadley. Jericho was the famous and daring bombing raid by 18 RAF Mosquito aircraft on Amiens prison in February 1944 which released a large number of Resistance prisoners and contributed greatly to the war effort in the run-up to D-Day. Sadly, two Mosquitoes including Pickard's were shot down. On the way back into town we also viewed the rebuilt outer walls of the prison itself.

The Conference began on Saturday morning at the Regional Arts Centre of Picardy. Around 60 delegates gathered for a day of presentations and discussions. These started with a presentation on the *souterrains* (man-made underground spaces) of the Somme département, including the *muche* at Domqueur visited by Sub Brit in the course of a French study weekend in 2002. Of particular interest to delegates was a report on the discovery three years ago and excavation of a previously unknown *muche* in the nearby village of Mesnil-Domqueur. We were able to explore both these *muches* the following day.

The next presentation featured the exploration and mapping of a stone quarry near Soissons, between Reims and Paris. This was followed by a report on the recent discoveries of the underground workings beneath the castle in St Gobain, near Laon northeast of Paris, and their relationship with the famous glassworks which now occupies much of the site. A number of Sub Brit members visited the site with Denis Montagne, the speaker, at a previous SFES Conference. John Van Schaik from the Netherlands then spoke about the protection of the underground environment within what he described as a "framework for valuation of underground cultural landscapes". An excellent lunch followed, served in an adjacent room; there was also time to browse an extensive bookstand of underground titles.

After lunch, Martin Dixon, aided by Linda, gave a presentation with some excellent photographs on the Australian opal mining town of Coober Pedy, a subject that has been covered in a recent edition of *Subterranea*. The history and geology of the area, unusual methods of prospecting and mining opals, the underground dwellings

What is a *muche*?

In the local language of Picardy, *se mucher* is a verb meaning 'to hide'. A *muche* is therefore a hiding place. In this part of France *muches* were dug out of the chalk below many villages in the sixteenth to eighteenth centuries, and have been described as "an underground refuge with a central gallery, or several galleries, giving access to separate rooms on both sides". Access was often through a tunnel from a concealed trapdoor inside the village church. Many hundreds of *muches* are now known across northern France.

Throughout history, northern France has suffered all manner of war and conflict, invasion and occupation. For over two hundred years, there were frequent disputes between France, Spain and the Spanish Netherlands, especially in the region that nowadays encompasses the

north of France and Picardy. The armies encamped along this front line were made up of soldiers recruited from all parts of Europe. As mercenaries, they would fight for whoever paid them, but their board and lodging was not included, so they had to live off the land at the expense of the local population.

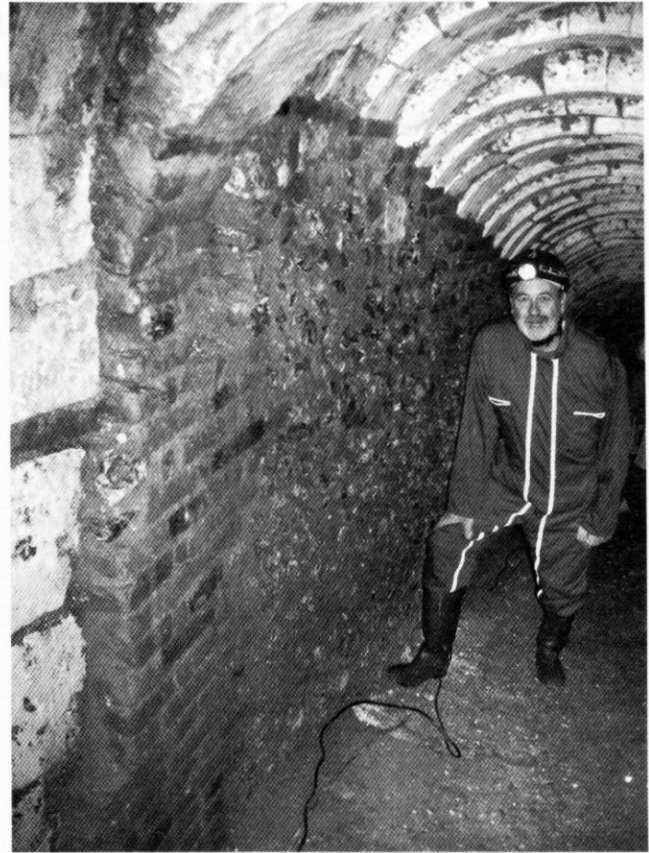
Moreover, it was not uncommon for soldiers' pay to be well in arrears, so they had no money. Constant pillaging and robbery thus obliged the villagers to guard their possessions against occupying forces, whether they were friend or foe. In the same way that fortifications protected people above ground, so the underground passages and rooms sheltered the local population, their farm animals and their food supplies, often for days on end. Some *muches* were used as shelter by troops in the First World War.

including hotels and churches, the harsh climate, even the town's cemetery, were all covered in a thirty-minute dissertation that the audience, to judge from the questions afterwards, found fascinating.

Next up were three SFES members from Italy who treated us to a presentation on the troglodyte dwellings beneath certain hill towns in the Italian region of Latium (Lazio), north of Rome. This was followed by another member of the Netherlands delegation, who spoke about the vast underground passages and tunnels beneath the castle of Fauquemont (Valkenburg), east of Maastricht close to the border with Germany. We hope to visit this site during Sub Brit's Study Weekend in Maastricht in May 2009.

After a break for coffee, our former Chairman Paul Sowan gave a detailed talk, with plans and maps, on the history and geology of the caves and tunnels beneath the town of Reigate and its castle, including the enigmatic Barons Cave, well known to many of our members. This was followed by a talk on the *souterrain* of Roche-Potier in the Loire Valley. The last offering of the day featured the *souterrain* of Marchiol in Temple-sur-Lot, southeast of Bordeaux, with pictures of its remarkable graffiti dating back several hundred years.

The following day, Sunday, again in bright sunshine, delegates gathered by the church in the little village of Mesnil-Domqueur northwest of Amiens. With hard hats and full gear, we clambered into a muddy hole beneath the west end of the church to explore the passages and rooms of the recently-discovered *mucho*. In October 2005, Bernard Petit and two colleagues had descended fifteen metres into a very deep well, broken through the side brickwork, and entered a passage to find around thirty chalk-cut underground rooms that had been sealed up for perhaps 150 years and subsequently forgotten. Eventually they broke through clay roof-falls and more



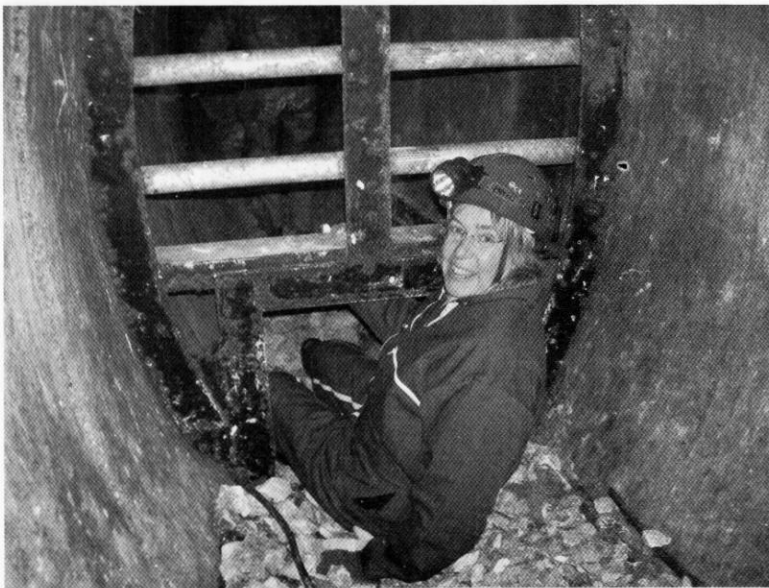
Martin in the entrance to Mesnil-Domqueur *mucho*, built in chalk, brick and flint.

brickwork to find the original entrance stairway beneath the church. It must have been a wonderful moment.

After this we visited the *mucho* at nearby Domqueur, now open to the public as a tourist attraction and mentioned above. Here we met our old friends Frederick Willmann and Hugues Dewerd from Groupe d'étude des villages souterrains du Nord de la France who were overseeing the visit. Delegates then enjoyed a splendid lunch at a nearby hostelry and later gathered at a

convenient car park close to an abandoned chalk mine at La Chaussée-Tirancourt. We scrambled through a tiny gateway, with permission of course from the local Mayor, into the dark and rambling recesses of the old workings and enjoyed finding fault lines, pick marks and graffiti with the beam of our lamps.

The proceedings came to an end with a group dinner at a fine restaurant in the centre of Amiens. Paintings on the wall reminded us that Jules Verne lived for most of his life in Amiens – and what better place for him to write *Journey to the Centre of the Earth*! It was a most enjoyable weekend and very well organised by SFES President Luc Stevens with the help of local groups. Members who are interested are welcome to join us next year, when the SFES conference will be in Luxembourg, on dates to be advised.



Linda about to limbo into the quarry at La Chaussée-Tirancourt

Bunkers and Coal – Sub Brit’s Study Weekend in Yorkshire

Linda Bartlett

This year’s Study Weekend (well three days actually) - was based in Hull, at the University’s Halls of Residence near the village of Cottingham, arranged by myself and Martin Dixon.

Friday 5 September

What a dreadful day, weatherwise. The motorways were full of spray and intermittent heavy rain, making for horrible driving and lots of us had truly difficult journeys. Even those taking the apparently convenient journey by train, who arrived at the nearby station of Cottingham, managed to get pretty wet walking to the Study Weekend Base. We’d arranged the use of one of the rooms in the old part of Thwaite Hall for our reception and check-in and had organised coffee and tea for arrival. This made a nice greeting as people gradually arrived and meant we could relax and chat to people during the afternoon. It was especially good to see so many new members attending a Study Weekend for the first time – 10 out of the total of 34 attendees.

No underground trips this evening, but we all found good places to eat – and drink – in the local village.

Saturday 6 September

Thwaite Hall provided standard student accommodation in single rooms, although nicely refurbished, and shared bathroom facilities – and the usual student breakfast – so we were able to stock up on all sorts of cereals and bacon and eggs etc, before collecting our packed lunches and heading off to our transport for the day. Normally we hire a coach, but today was special – we’d persuaded the coach company to let us have a double decker bus! This was doubly good; not only could we all pretend to be school-kids again and rush up to the top deck and get some fantastic views, but later on, as the heavens opened and we got soaking wet, there was plenty of space for dripping coats and boots on the lower deck. But to start at the beginning

RAF Holmpton

Our first site for the day was RAF Holmpton, about an hour’s drive to the east of Hull, out towards Spurn Head. RAF Holmpton was originally known as RAF Patrington, as it was built to replace the existing Type 7 GCI (Ground Control Interceptor) “Happidrome” Operations Room at nearby Patrington. The Holmpton site was built as an R3 site as part of the Rotor Radar network, but over the years served as a training establishment and as the wartime command centre for the then RAF Support Command.

On arriving at the site, the characteristic guardhouse immediately stood out. It seems strange that, in order to make the Rotor bunkers ‘blend in’ to the countryside, the main surface feature was built as a ‘typical’ country

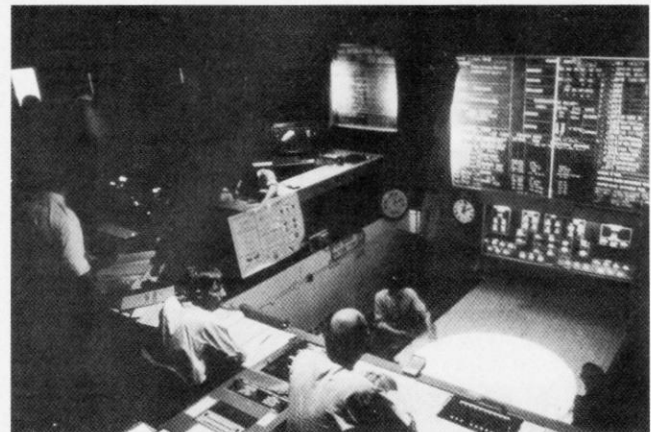
cottage, but actually to an unusual and standard design which shouts out its presence. The guardhouse looked even more out of place with a double-decker bus parked outside! We were welcomed with a cup of tea/coffee and got to meet James Fox, our host for the morning.



Sub Brit’s double-decker bus outside RAF Holmpton guardhouse. Photo by Linda Bartlett

James and his colleague Terry took us down the long 120-metre tunnel to give us a guided tour of the bunker, which is now in excellent condition having been restored and refurbished and contains many original artefacts. Having seen a fair few bunkers in parlous states of disrepair over the years, this really was good to see how it would look in working state. There were several good contemporary and recent films and videos to view, reminding us of the chilling threat of the Cold War, and the fact that the civilian population would effectively be abandoned whilst the military, the government and other ‘important’ citizens would run for cover in bunkers like this.

More detail on Holmpton



Photographic Display Unit at Holmpton in the 1950s

James was full of useful facts about the bunker - it originally cost £1.5m to build, and today would cost over £100 m. The bunker was created in one continuous pour

of concrete i.e. a 24-hour operation, shovelling in gravel from nearby Hull. Inside the bunker, water is provided from a bore hole and the 30,000 litre tanks should last the occupants a month; air is filtered twice and should have lasted the inhabitants for two weeks in the event that the incoming air supply needed to be cut off. James quipped that the bunker had a floor area three times that of the local Tesco Hypermarket. There is even a nuclear warhead on show, loaned from the atomic weapons institute.

Major changes to the interior of the bunker took place in the late 60s and early 70s; the two-level Operations Room was removed to make way for a large computer hall. An amazing discovery when a false floor was being removed during preservation was a complete Kelvin Hughes PDU (Photographic Display Unit). This 1960s device took photographs of radar plots onto 35mm film and projected the result onto the main plotting table, all within 45 seconds. Quite an achievement for the time and the one at Holmpton is the only remaining example in the UK.



The PDU at Holmpton today. Photo by Nick Catford

Time to move on to our second visit of the day, as we trundled off in our bus, tracking the minor roads down the coast. We had great views on all sides, going past today's gas storage facility and several wind turbines.

Kilnsea Coastal Battery and Sound Mirror

There are few underground features to view here, but well worth seeing as we were in the area.

The Godwin Coastal Battery was built as part of the outer defences of the Humber on the low cliffs near Kilnsea and was the terminal of the Spurn Point railway that supplied the Spurn Point garrison. The site originally consisted of two 9.2in breech loading (BL) guns mounted in circular concrete pits, underground magazines, crew shelters and workshops. On the right and left of the battery were two observation posts and a single coastal

artillery searchlight. The buildings are now crumbling away, as the sea continues to pound against the coast and eat away several inches of the ground each year. The current caravan holiday park occupies the site of the original barrack accommodation and it too is being lost to the sea. It was amazing to see colossal concrete gun emplacements scattered across the beach, lying at crazy haphazard angles and split apart by the force of the tides.



Remains of the eroded Godwin Battery.

Photo by Linda Bartlett

Some of the party sprinted along the path at the back of the caravan park and managed to track down the Kilnsea Sound Mirror standing forlorn and on its own in a field. This large concave concrete structure was one of a chain built along the coast as a forerunner to radar, acting as an early system to warn of the approach of enemy aircraft. The mirror (just concrete you understand, not actually mirrored glass!) is about 15 feet high and acted to focus any noise of approaching aircraft onto a microphone to amplify the sound.

Here, the weather was not kind to us – the heavens opened and many got soaked (not for the first/last time). It was nice to shelter back in the bus and have a chance to eat our sandwiches.

The route to the afternoon visit took us past the RAF Patrington domestic site and "Happidrome". Some remains can be seen in yet another caravan holiday park.

Our group split into two for the afternoon visit – and Party A definitely came off worst, weather wise. As they got off the bus to trek to the ROC post the rain started, and then the heavens opened – and stayed open for a good while.

Fort Paull

Meanwhile, those of us in Party B continued to Fort Paull – arriving a few minutes later in the same rainstorm. Luckily Fort Paull had some significant underground cover, so we were able to dodge between the underground batteries, magazines and caponieres and some found an underground bar! The underground parts of the fort contain some amazingly weird and varied

exhibits, although there is not much said about the Fort itself, so we had to rely on Martin's Study Notes for the weekend. The Fort was originally commissioned by Henry VIII in the middle of the 14th century as part of the country's coastal defences. Today's building on view is the fourth on site and was completed in 1864; it is the largest Napoleonic fortress still intact in the north of England. The Fort was bought in the late 1980s by the Fort Paul Heritage Project and their organisation is clearly struggling to maintain such a large edifice and set of exhibits; they have suffered dreadfully from floods and damp – exacerbated by today's rain! Despite that, it is possible to see the structure of the fort in pretty good detail – for example there is still glass in some of the lamp holes for the magazines.

There were seven gun emplacements in use at the Fort; each had its own underground magazine store from which shells would be hoisted manually and mechanically to the guns. These stores were mainly visible, although very damp and filled with exhibits (many unrelated!), but the main structures could be discerned. We were also able to visit the two underground 'forts within a fort' known as a Caponieres, accessed by a very long tunnel. Rifle slots can still be seen on the upper floor of the Caponiere.

But back to those weird and wonderful exhibits – the only surviving Blackburn Beverley aircraft; a display by the Humberside Fire Brigade; a reconstructed underground hospital (with a severed waxwork hand saying 'do not touch' – as if!); a salt cellar made from a vertebra of the beheaded Charles I mounted in silver and used by Queen Victoria; Goering's death mask and various waxworks of witches, Laurel & Hardy, Hitler and members of the Royal family and other ghastly tableaux. What a mixture!

Saltend Royal Observer Corps (ROC) Post

After swapping sites, Party B then visited Saltend ROC post in slightly drier weather. This post was opened in 1962, as one of the chain of over 1500 ROC posts across the UK, built to monitor the impact of attack by nuclear weapons during the Cold War. By triangulating measurements across the country, a comprehensive picture of nuclear explosions and fallout patterns could be gathered and reported to the local HQ. Warnings of attacks and fallout were to be given using sirens and maroons. Many posts closed in 1968 but the final posts were not fully closed until September 1991; during that period they continued to be used for weekly training exercises by the ROC volunteers.

The Saltend ROC post is owned by Charlie Hill, a member of Sub Brit, who kindly met us and opened up his post. For Party B he fired up the generator so we could see inside in good light. Charlie acquired the post when he took on the farm from his father – it just happened to be in one of his fields. From the post, there are stunning views of the Humber estuary and Fort Paul a few

hundred yards away. Charlie has acquired new doors from other posts, and is remaking cupboards to attempt a recreation of how it would have looked in service, but at the moment it is a pretty empty underground concrete box.



Party A exiting Saltend ROC post. Photo by Martin Dixon

We then reunited for the trip back to Thwaite Hall. As I said in my introduction, thank goodness we had the double-decker bus and not a 'posh' coach – the place was strewn with all manner of wet muddy boots and dripping anoraks and umbrellas.

“An Overview of Mining in the Yorkshire Dales”

After drying out a bit and tidying up, the group assembled for our Conference dinner in the splendid Dining Room of Thwaite Hall; the staff served us very well – and we had a nice meal with plenty of wine. Afterwards we adjourned to the Senior Common Room for a talk by our invited speaker, Mike Gill. We also brought with us the remains of the wine from dinner – which might not have been such a good idea! Mike gave us his promised overview of Mining in the Yorkshire Dales – and in fact it was an **over** view – Mike showed mainly aerial shots of the York Moors, showing the scars on the landscape caused by mining underground; notably there are a vast number of Hushes. These are caused by scouring a vein on the surface with water, to wash out the debris and allow surface mining of lead and coal. Talking about Hushes was quite appropriate as several of our group nodded off and so a Hush was called for! There were some lovely shots of the dales and moors, but sadly no Borrowdale Greyback sheep to be seen this year. We are grateful to Mike for driving over from Keighley to give us such an interesting talk.

Sunday 7 September

A lovely surprise this morning as the sun was shining as we set off in our coach to York. It was about an hour to travel, so there was some gentle snoring as people caught up on missed sleep after last night's slight excesses.

RO CHQ, Acomb

Our first visit today was to the Cold War bunker in Acomb, in the suburbs of York, now in the care of English

Heritage (EH). The bunker has only been open for tours since May 2006; in fact we were extremely fortunate to be able to gain access today, as EH had closed the bunker for several weeks due to bad air problems. We are indebted to Kevin Booth, the EH Senior Curator, for managing to get the bunker opened again in time – although he was a bit daunted by the thought of a large group of 34 of us traipsing round his site!

The bunker is today situated in the midst of a new housing estate, whose occupants did much twitching of curtains as the coach drew up. The bunker was actually built in 1961 in the grounds of an old Victorian house, previously used as the government offices of the Customs and Revenue departments. This was fortunate, as the MoD were able to requisition the apple orchard to build their bunker. It was also doubly fortunate later, as the offices continued to be used right through to the 90s. The bunker closed in 1991 and in 1998 it was about to be stripped and demolished; luckily Roger Thomas (EH, a great supporter of Cold War relics and a friend of SB) happened to be working in those offices, and he was instrumental in getting the bunker listed as a scheduled ancient monument and preserving it and the artefacts within the bunker intact.



The two-level operations room. Photo by Nick Catford.

The bunker was created as the HQ of ROC 20 group, receiving data from the ROC posts within their designated area, and in turn feeding data through to Eastern Sector Control in Lincoln.

We gathered in the canteen to watch an introductory film, made recently but including old footage; this gave an excellent overview of the Cold War, the role of the Royal Observer Corps and how they fitted into the chain of command at that time. Kevin and his team then gave us the **full** tour of the bunker, allowing us onto the lower floor to walk round the two-storey Ops Room. The bunker is amazing; it is preserved **exactly** the way that it was left in 1991, as the people taking part in the last exercise

closed the door, turned the key and walked away. The bunker is fully equipped with all the artefacts from 1991 – original notices pinned to the wall and left on desks, you could really sense the human side of working here – even the telephone number of the local fish and chip shop scribbled at the bottom of the ‘emergency numbers’ list – vital info for a long training exercise! The bunker was never vandalised as it was within the grounds of working government offices.

Operating the ROC HQ Bunker

The bunker was designed to be operated by a staff of 60 people although some 550+ were trained; thank goodness it was never used for real, only for monthly exercises which lasted a maximum of 36 hours, although it was manned every day by three ROC volunteers. In a crisis it was designed to be operated in 8 hour shifts, so only 20 beds were provided. Supplies were provided to last the volunteers 30 days underground and sealed off from the outside. Up until 1986 it would have been a bit fuggy during training – smoking was allowed down here. The original Ladies and Gents toilets are in use for visitors today. At the entrance can be seen the two decontamination rooms with showers and changing facilities. The lower floor has the original carpet tiles.

Within the HQ bunker, there is a full set of instruments paralleling those in a standard ROC post. The hapless ROC member would have to have exited the bunker through an airlock, taking a ladder with them in order to reach the roof and thereby change the paper in the GZI (Ground Zero Indicator). The two-level Operations Room still has its plotting table in the centre, along with all the panels around the room, so that all nuclear bursts can be plotted and traced over time.

Brunswick and Prospect Hill disused Railway Tunnels



Brunswick tunnel south portal. Photo Nick Catford.

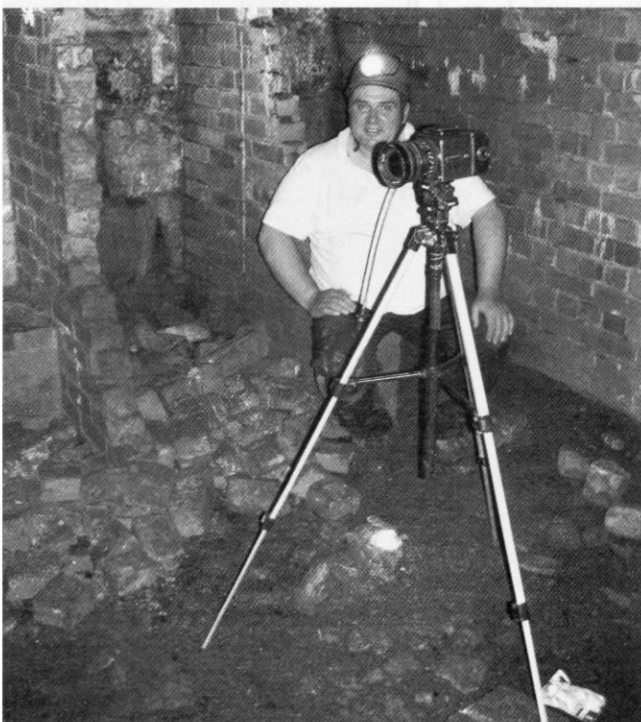
Back onto the coach and time to surreptitiously eat our sandwiches as we travelled the half hour to Harrogate. We had two disused railway tunnels on our visit list for

the afternoon, one nearly in the centre of the town, one on the outskirts. On the way, we stopped at a Garden Centre to allow purchase of wellies for several members of the group – a good idea as it turned out, as Prospect Tunnel still had a lot of water at the far end.

Brunswick tunnel was constructed in 1848 as a branch off the York and North Midland Railway from Church Fenton to bring trains into the new Harrogate Brunswick Station. The latter was abandoned after only 14 years as attitudes to noise and smoke relaxed and as the North Eastern Railway arrived in town from Leeds a new station was built.

Brunswick Tunnel

Our first exploration was of Brunswick tunnel. We parked the coach in leafy well-to-do Langcliffe Avenue (more twitching of curtains, and one man even resorted to mowing the municipal verge so that he could keep an eye on us!). We gained access through a garden and over a wall, and down a very slippery bank to the old trackbed level. The council had recently cleared access for us (for which many thanks), and they are in the process of installing a new, more secure, gate to protect the tunnel from unlawful access. There are no traces of the rails or sleepers, although the depressions of the sleepers can be seen in places, but there was plenty of debris and muck on the floor. The stonework on the entrance portal is still in good condition, as is the stonework and brickwork throughout the tunnel. At the far end are many very charming pencil-thin stalactites suspended from the ceiling, and some ‘fried egg’ stalagmites on the floor. The western end of the tunnel was used as an air-raid shelter, and the steps from the entrance can still be seen as they descend through the far portal; there are



Nick Catford in Brunswick Tunnel. Photo by Linda Bartlett.

several brick walls dividing up the shelter, along with the remains of bench supports and chemical toilet cubicles. Nick Catford joined our group for this visit, as he was keen to make a photographic record of the tunnel.

Prospect Tunnel

Our last visit today was to Prospect Tunnel, and we are indebted to Rudding Park Estates for allowing us access to the abandoned tunnel. Prospect Tunnel was also built by the York and North Midland Railway in 1848, allowing the Harrogate to Wetherby line to travel under the Rudding Park Estate. Just beyond the tunnel’s northern portal the line joined the existing Leeds to Harrogate line as it travelled over the magnificent 31-arch span of the Crimble viaduct.

As we made the short journey to Prospect Tunnel, we stopped briefly at a garage to buy soft drinks as it was actually a very warm afternoon. To get to the tunnel, we then had a pleasant walk along some leafy tracks in the sun, passing good views of Crimble viaduct. The tunnel is 825 yards long, and again still in good condition, with traces of the signal cable still in place at the far end. Water clearly seeps through the tunnel in many places, and there are deep pools along the length. At the far end the tunnel is flooded, but luckily only to a depth that we could paddle through in wellies. This tunnel is larger in profile than Brunswick and has three construction shafts along its length. At at least one point there is a slight step in the wall where tunnelling from different directions met.

Back to Thwaite Hall on the coach, with some more snoring on the way! There was no preset evening meal as part of the Study weekend, but about two-thirds of the group arranged to eat in the *Bluebell* pub in Cottingham, so we had an extremely pleasant convivial meal together.

Monday 8 September: Caphouse National Coal Mining Museum

All but one of the Study Weekend participants took advantage of staying on for the third night, and after yet another hearty breakfast we checked out of our rooms and set off on our journeys. About two-thirds of us were able to make the trip to the final visit of the ‘weekend’ – the National Coal Mining Museum at Caphouse, situated between Wakefield and Huddersfield. We had quite a few members from Scotland, but most elected to head back north, rather than adding more miles and more time to their return journeys (having had poor journeys in the rain on the way to Hull).

Caphouse is about 50 minutes away by car and we all made it, more or less on time. We were also joined by Mike Stace – able to escape from a family weekend to join us for this last visit. Martin had arranged that we would have our own private tour of the mine, descending in the miners’ cage (in two groups) and had specially arranged to exit through the old drift way. We were in

the second group and had a splendid tour, most entertainingly led by Steve, an ex-miner from Selby (all the underground guides are ex-miners, so they are able to describe techniques from their own experience). Steve started off by asking if anyone was from Lancashire (he was Yorkshire through and through!); Karen replied that she was, which automatically marked her out as Steve's 'stooge' for the rest of the tour. Steve asked Karen what she thought of this 'new-fangled electric light' that they had in Yorkshire, and how they managed in Lancashire with their gas TVs! The start of many jokes.

Our group of 14 descended 450 feet in the old shaft, in the original cage, having been fitted with helmets and

lights and had our 'contraband' confiscated – cameras, watches, electronic car keys, John's pipe etc. As a result, we have no photos from the underground tour. Once at the bottom, we had a tour round the mine, looking at exhibits showing the different stages of working. In actual fact, these are staged exhibits as the working face of the mine is many kilometres away, as the coal was worked away from the shaft during the life of the mine. However, we were able to see a good range of equipment, with some coalfaces in situ, with old machinery in place as if it was still able to work. Steve explained that the exhibits were described in seven languages; "what about Welsh?" asked Lyndon. "That's not a language, it's a speech impediment" quipped Steve.



Old wooden head gear at Caphouse colliery. Photo by Martin Dixon

History of coal mining at Caphouse

Mining was started at Caphouse in the 1790s in the Flockton Thin seam, close to the surface, although mining had been going on locally in the area since 1778, working the Flockton Thick seam until it was exhausted. At the end of Caphouse's working life the miners were in the Beeston seam, much deeper and now flooded. Women and children worked down the mine in its early days, from whence comes the saying "not worth a candle" – only the miners themselves had candles – the women and children toiled in the dark. In 1842 the law was passed forbidding children under 10 and women from working in the mines – although they still continued to undertake heavy jobs in the surface. Only in 1990 was the law repealed, allowing women to work underground again.

In 1850 the Flockton Thin seam was exhausted and the shaft was deepened to explore the Old Hards seam; this latter was itself exhausted by 1876, as the shaft was again deepened to the New Hards seam. The steam winding engine was installed at this time, and probably the present wooden headgear – the only wooden headgear left in the UK. The winding ropes are today carried by a modern steel headframe, hidden within the surface building – although the wooden timbers were still in use until the 1980s.

In 1942, the mine changed hands (not for the first time) and the new owner started mechanised development of the Beeston seam, via inclined drift and the Hope Shaft (next door to Caphouse). Coal was still mined by traditional hand-filling methods, blasting coal overnight; then the day shift, the 'fillers', came along and shifted ('filled') the coal onto the conveyors and into tubs. The afternoon shift, the 'rippers', drilled the 8 foot holes for blasting again overnight; any waste stone was packed in by the 'packers' to prop up the roof. In 1962, partial mechanisation was introduced and in the 1970s they were still working the same basic system, but with better machinery, taking coal from a face 200 yards long, with rams to move the conveyors forward, letting the roof fall down behind. As one face was being 'ripped', the next face was in development. The mine finally closed in 1985 and the Mining Museum was opened in 1988.

The Drift exit

And finally, we started to make our way up the Drift exit – 600 metres in length, 140 m vertical rise. The drift was originally constructed in 1974 to take out mined coal from the Beeston seam; this improved the productivity in the mine drastically; the old method allowed the production of 40 tons of coal per hour raised to the surface in two small tubs up the shaft; with the drift they could take 200 tons per hour on a series of conveyor belts. The remains of these are still in place, and the aim of the museum is to restore the last belt to working order, so that it can be shown to visitors. On the way out, quite a strenuous climb,

Steve stopped to point out the different coal seams we were walking through; and rocks in between the seams with their numerous fossils.



Drift exit from Caphouse, showing conveyor belt.
Photo by Linda Bartlett

Out into the daylight once more and time for a late lunch in the museum canteen. When first opened the original pit canteen was used for visitors but this is now a modern building. Without watches, it came as a surprise that we had been down the mine for over three hours! Most of us had time for a brief look round the surface exhibits, of which they had many, but we didn't really have time to do them justice – a good excuse to come back again some day! The museum is clearly well funded and has had support from the Heritage Lottery Fund; it is a pleasure to experience such a well run organisation preserving our heritage.

All in all, a successful Sub Brit study weekend. It's a lot of hard work making the arrangements, but it's always nice to get good feedback when everything goes according to plan. Watch this space for news of next year's study weekend(s).

References and Recommended Reading:-

Dixon, Martin, 2008, *Subterranea Britannica Study Weekend Yorkshire 2008 Site Notes*

Archives Team, 2006, *Royal Air Force HOLMPTON*, pub. HIPPO 3rd Edition.

Fort Paull Guide Book

Schofield, John, 2003, *Caphouse Colliery: A Brief Mining History*, pub. National Coal Mining Museum for England ISBN 1 872925 01 4.

National Coal Mining Museum for England Guide Book, pub. National Coal Mining Museum for England ISBN 978 1 872925 12 7.

Sub Brit website www.subbrit.org.uk

THE AUSTIN-LONGBRIDGE FACTORY – AN UPDATE

Neil Wedgbury

It is now 18 months since publication of my article (*Subterranea Britannica Bulletin* No. 32, pub. April 2007, ISSN 0307-1650). No further site information has come to the surface, other than many people stating that they did not realise how much existed and how secret it had been kept.

Imagine my surprise, when reviewing the Austin files of the late Barry Walker, an ex- Austin Apprentice, to find documentation referring to an article in *Practical Motorist* of November 1939 about Austin ARP (Air Raid Precaution) plans and from the same era, articles from *Motor* magazine. This completely destroys the supposed veil of secrecy surrounding the construction of all the ARP facilities just prior to the start of the war. The original source of this information is open to speculation; it would appear to be from a briefing from someone who did not know accurate facts or did not want to give away accurate facts; it does not appear to be from an Austin press release.

I have reproduced them and in brackets/italics made my comments and identified the probable locations as seen on the factory layout drawing in my article.

No reference to any ARP projects or costs could be found in the 1937 to 1939 Austin Accounts / Reports; after 1939 you were not allowed to identify any War-related items in the annual accounts / reports. After 1945 there is no mention either, other than a document published by Austin covering the War Years Production with little detail given on ARP facilities.

The whole face of the factory has changed in the last two years: all of the West Works, North Works, East Works and most of the South Works including the General offices are flat to the ground.

No removal of any of the major tunnel complexes has occurred, although a major roof fall has occurred in the Flying Ground Tunnels-Area D; the whole area is closed to all personnel access. In early 2008 the entrances to

East Works-Area E were sealed up with a few hundred tons of crushed aggregate which only a large digger would be capable of moving. However, recently this aggregate has been moved, leaving only about two feet in front of the gates to prevent access; one can only surmise that it was done to maintain an air flow through the tunnels. Trentham Emergency HQ - Area G, remains totally flooded. The condition of East Works Tunnels – Area F, remains unknown.

Practical Motorist, November 1939

AIR RAID PRECAUTIONS AT LONGBRIDGE

What is probably the most comprehensive and carefully worked out system of Air Raid Precautions in Great Britain is now in a forward state of preparation at the 100-acre factory of the Austin Motor Company, where 22,500 persons are at present employed.

The chief protection at Longbridge will be afforded by three main shelters, one centrally situated, another behind the West Works where Austin bodies are built, and a third adjacent to the new Aero factory.

(The Aero Factory is the East Works, the shelter is East Works Tunnels – Area E.)

The central shelter which is already complete except for a few minor items of equipment is a 150 yard underground tunnel, with walls of brick and roofed with reinforced concrete. It will accommodate 750 of the female staff, and certain key executives constituting the control of the fire and gas fighting force.

(The Central Shelter is Trentham Tunnel Complex - Area C.)

A telephone exchange within this shelter will maintain contact with and control operations from the other shelters throughout the factory and having its own motor generator it will not depend on any outside supply of electricity.

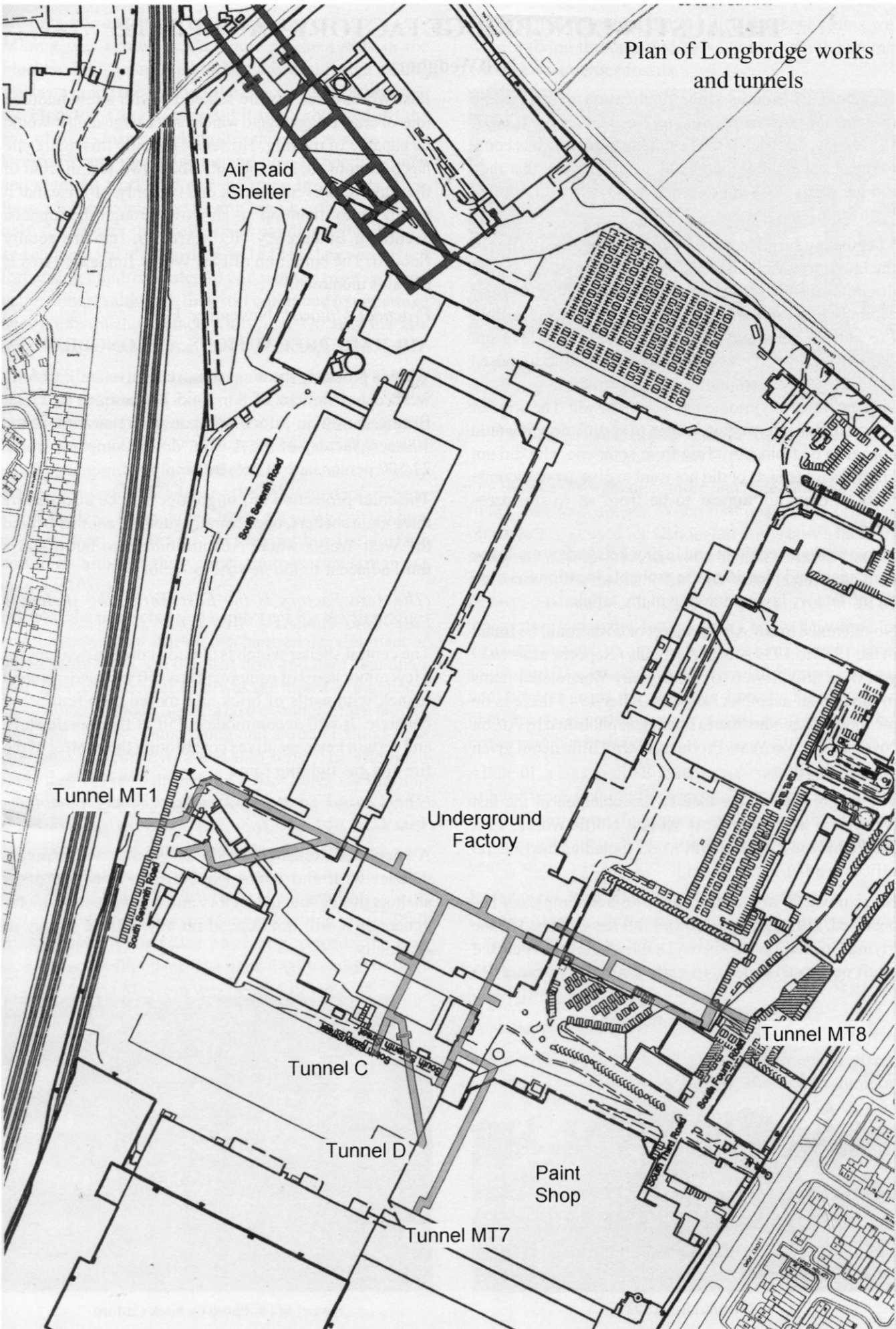


Longbridge in 1939



Tunnel MT8. Photo by Nick Catford.

Plan of Longbridge works and tunnels

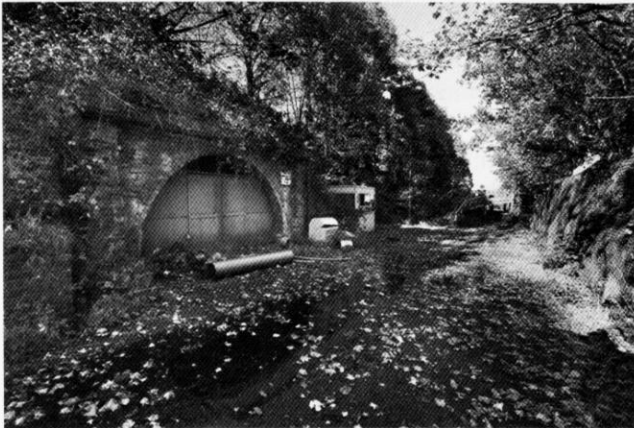


(The Telephone Exchange is Trentham WWII HQ - Area G.)

Its entrances are heavily protected by 10,000 sandbags, and it provides safety against anything up to a 500 pound bomb.

The shelter behind the West Works, now in an advanced state of construction, is an even bigger undertaking, since it will accommodate over 4,000 persons, so that the entire female Austin staff, as well as many male workers are given protection.

(This Area is West Works No 1 Complex - Area A.)



Tunnel MT1. Photo by Nick Catford.

CONCRETE SHELTER

This shelter is being constructed of reinforced concrete on the floor of a disused sandpit, which will be filled in when the shelter is completed, to leave it 35 feet below ground. Over 30,000 cubic yards of soil excavated for extensions of the Longbridge railway sidings will be available for this purpose.

This shelter will also be a centre for active workers, fire fighters, a decontamination squad, and a first-aid service, in addition to two further shelters heavily protected against splinters, blast and gas, housing similar services.

(West Works Complex No 2 - Area B.)

The second line of defence at Longbridge will be in the nature of an extensive covered trench system, located on three sides of the factory which will accommodate all the male workers and to which in case of emergency, the entire factory would be evacuated except for one man left in charge of the boiler house.

In connection with the trench system a number of volunteer first-aid men and stretcher bearers are being enrolled from amongst the workers to bring casualties to any one of the three protected 'hospitals' within the factory.

(The trench system was not implemented, although the East Works Tunnel Complex - Area F was a cut and cover system. Little is known about this complex:

it may have been built and owned by the Air Ministry who owned the adjacent East Works Shadow Factory. The hospitals in reality were large well-equipped First Aid Stations that would serve as A & E Departments in time of emergencies and located in protected Areas B, C, D and E. The main Medical Block was unprotected, located in the South Works. In 1942, three doctors were employed and a total of 14 medical facilities existed).

OBSERVATION POSTS

Additional to all these precautions, two splinter-proof observation posts, heavily constructed and protected with sandbags, have been built on high ground on each side of the factory. From these posts observers will be able to witness any damage to the factory and by sights determine its location within the hundred acres of buildings.

(One was located above West Works Tunnels - Area, the other believed to be above the entrances to East Works Tunnels - Area E.)

These observations will then be reported to the 'bridge' in the central shelter from which the fire fighting and decontamination services will be directed if immediate action proves necessary.

(The 'Captains Bridge' was in the Trentham WWII HQ - Area G.)

Supplementary to these precautions coloured plans of the trenches and shelters allocated for each department or shop are being displayed throughout the factory, showing the routes of evacuation. Road-ways and bridges have been modified to suit, and in every shop a warning siren with a special note has been installed.

Altogether, with these shelters, the covered trench system and the reinforcement with equipment and personnel of its fire fighting service, the Austin Motor Company is spending £20,000 on Air Raid Precautions.

(No reference to ARP cost in the Accounts.)



East works tunnel entrance. Photo by Neil Wedgbury.

The Motor 15 November 1938

AUSTIN ARP

A most comprehensive system of ARP work is nearing completion at the 100-acre Longbridge factory of the Austin Motor Company, which employs 22,500 workpeople. The system provides for protection as well as coordination of anti-fire and anti-gas activities.

There are three main bomb shelters, equipped with telephones and first-aid services, and an extensive trench system, plus protected observation posts on high ground. The cost of the undertaking is about £20,000.

(Comments as above.)

The Motor February 1939

MORE AUSTIN ARP

Having completed a first scheme which provided deep air-raid shelters for 5,000 employees, the Austin Motor Company is now embarking on a new £25,000 scheme to build deep shelters for over 10,000 more factory workers. The plans provide for a huge tunnel system

under the factory test ground and nearby airfield, and will replace extensive trench systems contemplated in the first plan. The tunnels will include lighting and ventilation, rest rooms, first-aid posts and loudspeaker equipment.

(Flying Ground Tunnel Complex - Area D.)

The Motor 30 May 1939

CONTROL WELL

They are digging a very deep well about 25ft deep in the Austin works. This, when it is completed will be the control centre of the factory to which the executives will retreat in an emergency with a telephone exchange communicating to the works and outside world. For the staff they are now excavating tunnels and steel and concrete chambers in a cliff-like mound that rises some 30ft above the works, where it will be possible to shelter 10,000 men in an air raid.

(The Well is Trentham WWII HQ - AREA G, the staff area is again Flying Ground Tunnels - Area D.)

Site visits – please Sir, can I have some more?

Martin Dixon

One of the reasons members join Subterranea Britannica is to have the opportunity to participate in trips to underground sites. We also know that one of the reasons people leave the Society is disappointment that there aren't more trips. What follows are some thoughts as to how to prevent becoming a member of the second group.

Get active electronically

Sub Brit has two main email groups – subbrit@subbrit.org.uk and announce@subbrit.org.uk. The former is for general exchanges about underground and cold war matters and this of course includes lots of sites. The list is often used to post invitations for forthcoming trips – sometimes an open invitation, sometimes to fill one or two places. If someone mentions a site that they have visited, ask them how to get access or if they would arrange a trip for other members. The announce list is very low volume and used to notify details of 'official' trips and events (the distinction is that official trips are covered by Sub Brit's liability insurance and as such have to be OK'd in advance by the Committee). In order to increase the number of official Sub Brit trips, Committee member Bob Templeman has agreed to act as 'Day Trip Coordinator'

Make yourself known

At Sub Brit events, like Day Conferences, seek out those with common interests. Sub Brit has experts on all manner of sites and most are pleased to share their knowledge with others. For example around a dozen Sub Brit members own ROC posts that they will happily show

fellow members. Other members have access to mines and quarries, air-raid shelters and bunkers, follies and tunnels. Everyone in Sub Brit was once a new member so don't be backward in coming forward! If you do get a place on a trip and find you can't make it, then please let the organiser(s) know. 'No-showing' is a good way not to get invited to future visits.

Attend Study Weekends

For many years, we have organised two 'study weekends' per year – one in the UK and one in Continental Europe. Don't be put off by the title – these are essentially a two or three day programme of visits with fellow members. We usually have an evening speaker and provide a pack of notes for the sites to be visited. The 'study' is limited to listening to and reading these and forming your own impressions of the sites. The organisers usually try and ensure there is a mix of sites covering different interests but sometimes they are more focused. The evenings are ideal for getting to know other members and talking about common interests. Local contacts who help with sites and guidance are often well (pun intended) placed to help gain access to other locations.

'Public' sites

As well as trips organised by Sub Brit members, the email list is often used to alert subscribers to other trips, talks and openings. Sometimes these are part of the yearly Heritage or Open House weekends that cover the UK. Others sites are supported by local interest groups who may themselves be members of Sub Brit too. Sub Brit is





considering producing as a service to members a guide to underground sites which are open on a regular or occasional basis.

Check out *Subterranea*

Three times a year, just before *Subterranea* goes to press, we update the *Diary* section to include known events. As well as Sub Brit events, we try and include other events such as those organised by NAMHO (NAMHO is the National Association of Mining Historical Organisations of which Sub Brit is a member) and Industrial Archaeology groups. Sub Brit is also linked to a number of like-minded societies across continental Europe and we include details of their events too when known. Any Sub Brit events will often be described on a separate flyer with a booking form. Members can of course help complete the circle by sending event details to *Subterranea* for publication.

Become a trip organiser

One of the most satisfying ways to get to your favourite sites is to arrange trips yourself. Guidelines on this are in the Sub Brit handbook but see below for some tips. Sub Brit's third-party liability insurance may be useful in gaining access to certain sites; however, please don't claim to represent *Subterranea Britannica* until a trip has been made 'official' by the Committee.

A written or email approach to request a visit has some advantages over a phone call in that the request can be more easily passed on within an organisation if necessary. In making such a request, it is often useful to mention that appropriate PPE (personal protective equipment) will be worn such as helmets and footwear. Some organisations may request a risk assessment be completed. This shouldn't put you off; a risk assessment

is a list of possible hazards that may be encountered and a summary of how they will be mitigated or managed. A suggested template is at the back of the Sub Brit handbook. Engineers are often more accommodating than administrative staff regarding visits if you can track them down.

If permission for a visit is given, then please ensure you abide by any restrictions placed. It is worth explicitly clarifying the owner's position re the taking of photographs and their subsequent publication. Once given permission, then please try and invite fellow members, whilst staying within numbers that are appropriate to the site. The Sub Brit email list is a free and straightforward channel to use. Don't forget to give a clear meeting point (grid reference and/or postcode) as well as time and date. If you can compile a page of notes or plans before a visit then so much the better. Let all participants know what equipment and clothing will be needed eg helmets, lights, boots and of any potential hazards within the site. Please ensure that all artefacts are left in situ – removal of these is almost certain to close the door on future visits.

After the visit, a few words of thanks for the owner are always worthwhile. If members of the group have any observations on the site then owners are usually delighted to receive them. A short article for *Subterranea* after a trip is a nice way to help those unable to attend to share in the site. If you are at all uncertain about arranging your own trip for Sub Brit members then feel free to contact the Committee on info@subbrit.org.uk for guidance and support.

Not all trips are dished out 'ready to eat' but with a bit of effort you should be able to fill your bowl next time it's empty. **More, Boy?** Absolutely, why not!

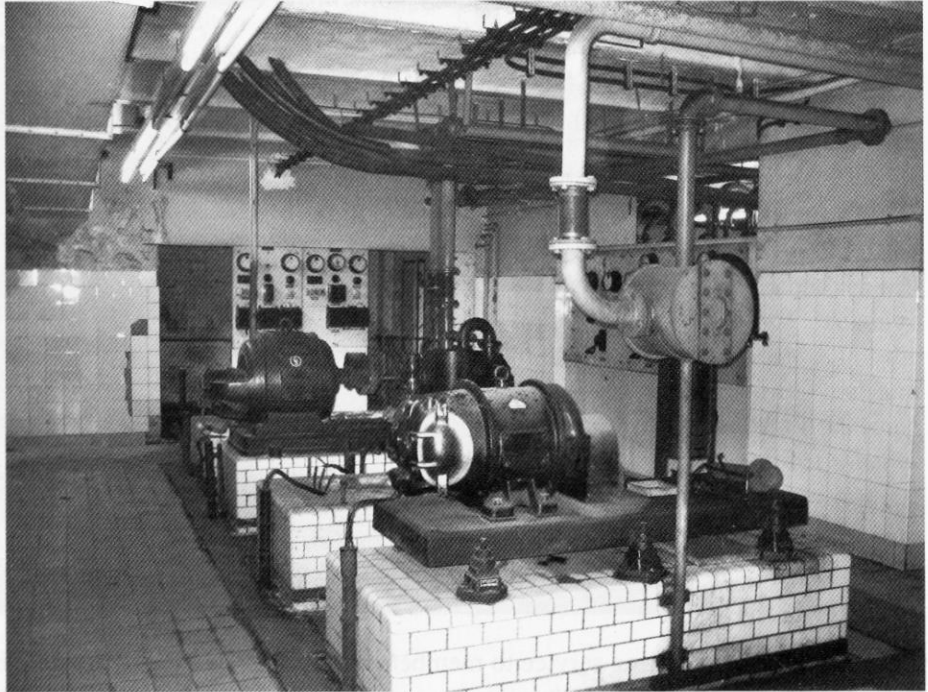
A Weekend in Berlin: July 2008

Jane MacGregor

Having now decided that perhaps I could face a Bockwurst again following the May Germany tour, I contacted Sascha Keil at Berliner Unterwelten (BU) and arranged to come over with a small group of people for a descent of the Humboldthain Flaktower, which we visited on the 2007 Study Weekend. The non-standard trip goes beyond the public tour route and involves scrambling and ladders, so is best suited to small groups. We made our way through the former seven levels, which have been reduced to shattered concrete and rubble by the attempts to demolish the building at the end of the war. BU have cleared a lot of the rubble away and made some more good finds in it: among

them an old helmet from the First World War which was probably used during the battle for Berlin in the last days of the Second World War, when equipment was so scarce that people used anything they could lay their hands on, including antique weapons. We descended down to the service tunnel level at the bottom: these are in good condition and there is a lifting ring above one of the hatches for heavy equipment. Subterranea 14 has a write-up on the flaktowers in the Berlin Study weekend article.

Afterwards we were given a special treat. Berliner Unterwelten had been investigating Humboldthain Park with geophysicists and in recent weeks had uncovered two Second World War shelters for mothers and small children. It was thought better to provide safe accommodation where they and their children could sleep

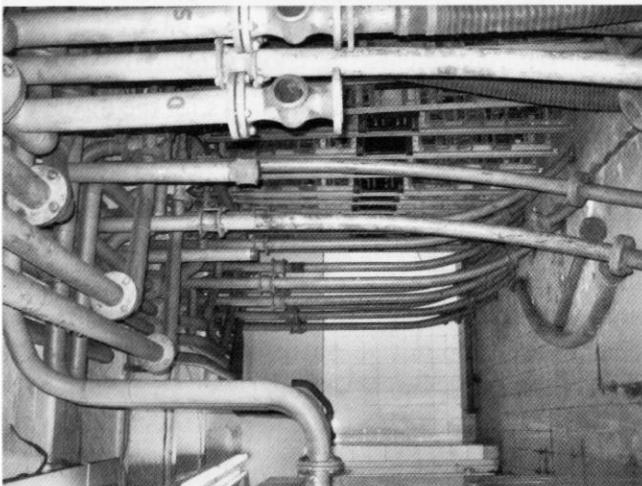


Pumps

for the night as safely as possible during the raids, in order that they would not be too exhausted to continue their war-work the following day. This was common practice in Berlin and several other “mother-and-child” shelters survive in the city. The flooded bunker we visited on the 2007 Berlin Study Weekend was one of these which had remained intact; the ones in Humboldthain were blown up after the war in accordance with the Potsdam Agreement.

The newly-discovered shelters in the park had only been open for a few weeks and we were among the first foreign visitors to go in. Berliner Unterwelten are being featured in documentaries on Channel 5 (some members may have seen the recent programmes in which Sascha featured with Anthony Beevor). The television company has contracted Berliner Unterwelten to allow exclusive rights to the photography and filming of any new sites until the completion of their work, so we complied with the request not to photograph the site. The photography embargo will be lifted at the end of filming and, fear not, I will organise further trips.

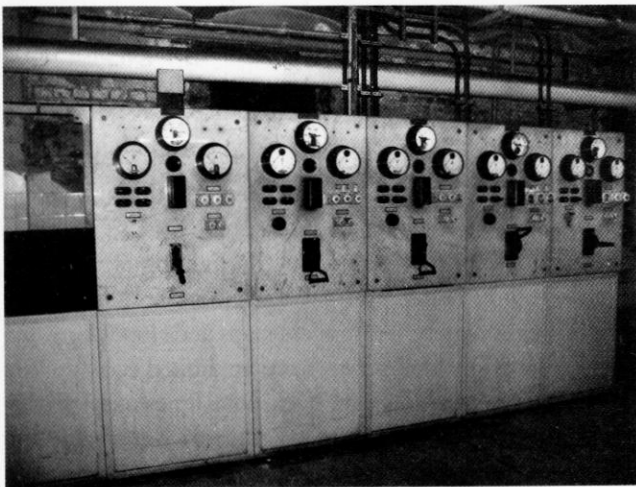
Entrance in both cases is via a concealed manhole cover down a concrete pipe which leads into the remains of the bunker. As at the flaktower, there are massive lumps of concrete and twisted rebar everywhere, and it is not immediately obvious how the sites would have looked, although in one bunker a small room numbered 24 is more or less intact. A corridor is still identifiable and still has its two-colour paintwork, and the radium paint surviving on the standing walls will still generate light after little



Pneumatic Tubes

illumination. In one area a large piece of ceiling has been turned over by the blasts. The odd cable conduit and junction box still survive, and ventilation ducting is still apparent, most of it crushed under fallen concrete. It is only possible to move around this site by clambering over and under the massive concrete blocks - it is probably the closest you will get to caving in a bunker and not for the unadventurous.

This bunker is a treasure-trove of small household objects. After the war, Berlin's streets were blocked with rubble which had to be cleared quickly, and much of this work was done by the Trummerfrauen, or "rubble women", who would sort the rubble by hand and salvage usable stone. Small railways like those seen in mines were erected in streets and the reusable material pushed away, while unusable debris and rubbish was disposed of anywhere that could be found, often down bomb-craters in the ground. The bunker is full of small items like beer and medicine bottles, broken candlesticks, crockery and even a box of old pumice stone. Some of this material is clearly from the war rubble. We found a small iron rail sleeper in one room; it is possible that this came either from the nearby flaktower's ammunition handling or from the small railways used during the clearance. The second of the two bunkers also has an almost-complete Gothic arch from the window of a church which had stood in the park. Although unsuitable for general public tours, the aim is to keep the bunkers accessible for the interested.



Switch Row

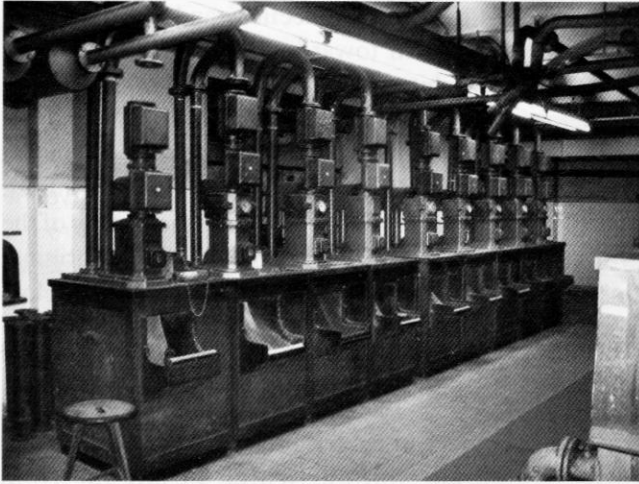
BU were having their annual social barbeque up at the flaktower that evening and kindly invited us, but having been awake for around twenty-one hours we retreated to the Holiday Inn, which has a great view of the flaktower, for an early meal and then bed.

The barbeque went on until 4a.m., so after breakfast we went to Pankstrasse U-Bahn station to show Tim the entrances to its integral nuclear shelter and blast door tracks before meeting Sascha late in the morning for a cup of coffee (in his case much-needed) before heading

to the site of the Reich Chancellery and Fuhrerbunker. After this we headed towards Unter den Linden. BU has set up an exhibition focusing on the Germania Plans in a temporary building near the Holocaust Memorial. The prize exhibit here is the scale model of Germania which was used in the film *Der Untergang* (Downfall). There are plenty of displays explaining the history of the project and the odd artefact or two, including an original floodlight fitting from the Germania road tunnels below the Tiergarten which we visited in 2007. This exhibition is well worth a visit and will be in this site until the end of 2008.

After a quick beer in a very funky bar we went to the former telegram station, which is not far from Alexanderplatz. BU at the time had the use of the basement here, which houses the former pneumatic postal system equipment, known as the Rohrpost. This was originally sited above ground level as the system was sensitive to damp; the pipes ran underground but the sorting system was above ground. Our guide Ingmar Arnold gave us an interesting presentation on the history of the Rohrpost, which was actually in use as late as the 1960s, finally becoming disused in the 1970s. The system at one time covered many kilometres, but was reduced in size by damage in the Second World War and then by the division of Berlin: most of the network was in East Berlin and services to the West were cut.

The equipment is sitting in the basement room and does not have a "museum" feel to it as there are no interpretation boards or glass cases. There is a beautiful wooden sorting rack with the tubes coming into the top, air compressors and electrical control equipment. There is a Siemens compressor of around 1920s vintage, and next to it is a green-painted modern version. Unable to source another machine from Siemens after the division of Berlin, the engineers dismantled one of the original machines in order to see exactly how it worked, and then built their own copy, which is inelegant but functional. There is a large apparatus for drying the air before it was compressed and fed into the pipes and several sets of control boards; the newer East German-built model consists of the usual closed cabinets, but the early 20th-century versions are made from ornamental marble with ceramic and Bakelite controls. These were quite nasty to work with as the cool marble acted as a cold sink, causing condensation on the electrical contacts which would then emit sparks. Cut and intact postal tubes emerge from walls and ceiling throughout the basement. There is an access route into the telegraph building above, which is currently empty. The painted shutters behind the windows are made of thick steel plate to protect against blast and date back to the Second World War. The equipment is beautifully preserved, and as it is more or less as it was left, the whole room has a very authentic feel to it. When Ingmar dropped a capsule through one



The Rack

of the pipes into the catchment tray to demonstrate the unique sound, it was not too difficult to imagine the system in its busy heyday.

All too soon it was time to head back to the railway station; in Mike's case to go straight home and for the rest of us to the airport, battling our way through engineering works and revised train timetables in the process. Once at the airport

everything else went very smoothly and those of us who flew back to Luton had our bags back and were through immigration in fifteen minutes - unheard of in recent years!

On a family "tourist" visit to Berlin three weeks later, I caught up with Ingmar and learned that the building is in the process of being bought by an investor who wishes to redevelop it and intends to stop access to, and potentially even demolish, the Rohrpost rooms in the basement. BU were attempting to negotiate a way of keeping the site and reopening it once development has finished. The site is a very small part of the building complex and could be run independently without troubling the owner. In a sad update, access to the site was lost at the end of October 2008. I would hope that at least the machines could be saved as these are in magnificently good condition. The excellent Museum of Communication touches on the Rohrpost but only displays a few feet of pipe and a capsule.

I would like to thank Sascha, Torsten and Ingmar and the other members of BU who helped organise everything and more than earned their beer. The Sub Brit members on the trip were Mike Barton, Bob Clary, Jane MacGregor, Tim Robinson and Robin Ware.

(Photos by Jane MacGregor)

Castillo de San Felipe – a Colombian fortress

Martin Dixon

The Foreign and Commonwealth Office advice on visiting Colombia includes the warning 'There have been several cases of assailants using drugs to subdue their intended victims. Drugs can be administered through food, drinks, needles, cigarettes, aerosols, powder, and have even been impregnated in 'flyers' handed out at traffic lights'. Cautious but undeterred, Linda and I were determined to explore the city of Cartagena on the Caribbean coast. of Colombia. Founded in 1533 and named after the Spanish port of the same name, the old town and its fortresses became a World Heritage site in 1984.

The old town is still largely surrounded by 11 kilometres of 17th century defensive walls which include a number of small forts, defended gateways and protected magazines. The defences were to secure the port from where huge amounts of gold and silver were exported to Spain and where large numbers of slaves made their landfall. Where the walls meet the Caribbean Sea there is a large and impressive Malecon (seafront road). The whole is very reminiscent of Havana and quite possibly shared the same architects. The jewel in the crown of the port's defences, however, is the immense Castillo de San Felipe de Barajas.

This is the largest and strongest castle ever built by the Spanish in their colonies. The original fort was built atop the 40 metre high San Lazaro hill between 1639 and 1657. Most of today's structure dates from around a century later when the whole hill was fortified with a series of five concentric defensive walls and slopes. Many attempts were made to take the fort but none ever succeeded. One of the secrets

of the defence is a series of complex underground passages, linking different levels and structures. Some of these lead to protected firing positions but many of them have no firing loops and appear to have been built for storage, protection and to facilitate rapid movement around the fort. Some of the passages have vertical shafts to the surface which may have been used in construction or to aid ventilation.

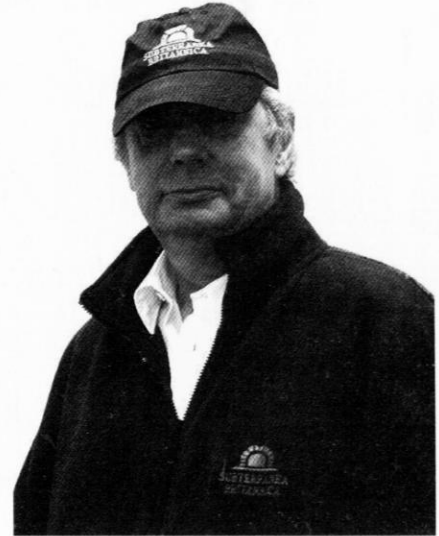
Gaining entry to the fort today only requires the payment of a small admission fee. Once inside, many of the passages are open to explore – some electric lighting exists but a torch certainly helps. The passage floors are covered in quarry tiles and there are frequent steps and slopes between levels. The walls themselves have an arched construction and are built from a mixture of brick, coral limestone masonry and concrete with occasional natural bedrock. One guidebook claims that the construction was intended to amplify the sounds of the feet of any approaching enemy but this seems a little fanciful. Herds of screaming school kids were easily audible but almost certainly somewhat louder than attackers in the 18th Century!

The rest of the fort includes many batteries, lookout towers and some surface buildings identified as a hospital and headquarters. The view from the top of the fort is stupendous; it is said many of the surrounding defences were built intentionally low so as not to interfere with the firing trajectories from Castillo de San Felipe. Having explored the fort we retired to a nearby bar for a Club Colombia beer which I'm happy to report was both unadulterated and very pleasant.

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